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The World Power Conference.

THE second World Power Conference, which came to its close last week, has furnished a plentiful supply of food for thought, and from its general proceedings quite a number of lessons may be learned.

We must first express our sincere regret that Mr. D. N. DUNLOP, the originator of the Conference, was unable to attend the meeting through illness. To Mr. CHARLES RODGERS, Secretary of the B.E.A.M.A., praise must be freely given for much hard work.

The Berlin meeting of the Conference seemed to show a trend towards the economic side of the question much more than the technical; this is rightly so and we believe that the third meeting, to be held in America, will greatly develop this trend. From this point of view America's position between Europe on the one hand, and the "East" on the other, cannot but be advantageous.

Dr. O. OLIVEN'S address on the European "Grid" may be an economic ideal, but it is a further indication of the same trend. On the other hand, Sir ARTHUR EDDINGTON'S vision of a year's supply of power contained in a teacup may upset these calculations at some future date, but the economists of that time will have undoubtedly written off their plant and created sufficient reserves to enable them to control the power let loose.

The Conference produced some interesting technical papers, but they were unfortunately put in the shade by about 8,000 pages of technical matter published simultaneously, so that it is rather doubtful if the majority of the contributions will receive the attention that some of them undoubtedly deserve.

Discussion of the papers became impossible by weight of numbers and indeed it was non-existant, or practically so. It was rendered even more difficult by the method of translation, which in our opinion is based on an entirely wrong principle. The transmitting apparatus proved to be an excellent innovation as such, and, apart from one or two early troubles, was certainly an advantage. Simultaneous technical interpretation into several languages, especially when an attempt is made to synchronise with a speaker reading from text, does not give good results, and one or two

modifications in the principle are necessary to render really free discussion, which is the essential point of technical meetings, possible and intelligible to the listener.

The managing committee must be congratulated on the enormous organisation it built up for dealing with approximately 4,000 participants. The committee set itself out to show the visitors what Germany could do, and deserves great praise for having in so large a degree attained its object. The *Weltkraftfest* was a magnificent piece of organisation, a really concentrated picture of the German nation, an education in itself to the observer.

From the opening meeting (which we cannot pass over without reiterating Sir CHARLES PARSONS' words that the Conference could not be considered complete in the absence of the late Dr. S. Z. de FERRANTI) until the close of the Conference, there was not a single moment unoccupied. Official support was afforded freely, and receptions were given by the Reichstag, the Cabinet, and civic authorities of Berlin. Every works within possible touch of the centre was thrown open, and, judging by the number of visitors who took advantage of this facility, it was highly appreciated.

In viewing the meeting as a whole there can be no doubt that the World Power Conference, in drawing together such a vast number of engineers, has supplied a want and was a success. We definitely feel, however, that its success, great as it is, is of an economic nature. Its proportions are too great, and its scope is far too vast, for any technical contributions of lasting value to be made. Scientific and technical achievement is the root base of economic advancement, but international interchange of scientific and technical information can only be made by the specialists in the various branches of industry at more intimate meetings in a less feverish atmosphere, undisturbed by much of the distracting hustle that is inevitable at such large gatherings.

Engineering is becoming international—electricity more so than perhaps any other branch; its international organisation is already highly developed in certain respects, as evidenced by the work of the International Electro-technical Commission, which has proved invaluable in many directions. The rôle of the engineer is not only to adapt the forces of nature for the benefit of mankind, but also to carry out the process in the most efficient manner. Scientific and technical workers of the world are working on common problems and large sums of money are being spent on research work in different countries, often on parallel tracks. The rapid international inter-change of information on a well-organised basis cannot but benefit the electrical industry as a whole, and the second World Power Conference has shown what can be done on a large scale over an extreme range.

Electrical engineers of to-day could and should complete their international co-operation in order to supply the world power economists of the future with nothing but the essence of their united efforts.

Market Research.

THE business research movement has been the subject of many articles in the ELECTRICAL REVIEW during the last few years. Expert authorities who have specialised in it have given us the benefit of their experience and students looking for a career in the scientific application of business research methods have added thoughtful contributions. The urgency of promoting new trade, finding and opening up new markets, also securing more economic production and more efficient salesmanship, have been brought painfully home to us all by the serious growth of unemployment, and everybody industrial ought to be applying his mind seriously to the problem. Close readers of these pages know that these are themes that have been urged upon their notice for many years with great benefit to our electrical export trade; but it is imperative that we all note the constant need for adapting our practices to the changing situation. It used to be the outstanding practice of principals of our great engineering concerns to travel extensively, covering the same ground every few years; by such means fine connections and great business reputations were built up. Travellers were engaged to follow them frequently and, when found, good agents were appointed or branches were opened. This was really trade research and trading enterprise. One could easily give names of eminent electrical manufacturers who are finding it worth while to travel great distances to-day, to cement old, and to form new, relationships. Another kind of research was done officially by the Board of Trade, the Foreign Office and then the Department of Overseas Trade—sometimes it was efficient, often it was otherwise, but traders at home got what they could out of these reports. The Trade Press also got early to work gathering information from all parts where it could find advisers; its work was difficult, but it was very important and often recognised as being of great value. It not only conducted its own research for the benefit of its readers and advertisers, but it saw that its publications found their way to the right places and the right people where trade demand was to be anticipated. Now we are being advised that however good and indispensable all these weapons have been, the developments in the science and practice of advertising must be availed of by traders. A new helper comes upon the scene, described as the Advertising Practitioner, an advertising agent who must travel to make a study of certain markets overseas. It is questioned whether the science of advertising is evolving on the right lines and Sir Harold Bowden suggests that the "Advertising Practitioner" will have to become a sales manager or "sales consultant" in time if we are to find new overseas markets to keep our factories from closing down. It is advised that the principles of business research must be applied to the problem of national publicity and that efficient local publicity is a vital part of national publicity. This applies rather to the sale of electricity and apparatus, boosted by an E.D.A. campaign, rather than to an overseas trade effort.

There is not the slightest doubt that efficient publicity and world trade travel are interlocked subjects and that they must be treated as important sections of market research as a whole, but no matter how far we may find it necessary to carry the application of the new science, it is positive that the strong trade journal will continue, if properly distributed, both to give its trade the needed efficient publicity and to be an essential agent for world travel. It reaches the right spot and helps to open the market for principals or advertising practitioners, salesmen or travellers, when they take their walks abroad. The trade journal goes before and follows after too—it is always there and always telling its story.

Ultra-violet Rays.

THE medical officer of the Glasgow Education Authority, Dr. E. T. Roberts, is one of the latest authorities to attribute a high value to ultra-violet radiation in the promotion of health. In this he follows a number of experienced practitioners who claim to have obtained excellent results in both general and particular applications of ultra-violet rays.

On the other hand, as we understand the situation, what may be termed official opinion is considerably less than luke-warm in its attitude towards the subject.

A few years ago "artificial sunlight" became a fashionable craze, and much harm was no doubt done by irresponsible persons who raised expectations of a panacea in the minds of the ignorant. Discounting absurd claims, however, there was certainly then a very free expression of medical views justifying more than a pious hope that a new field was to be opened in which electricity could enormously benefit mankind. We are well aware of the ease with which the wish may become father to the thought, but we may be permitted to hope that medical orthodoxy has not said its last word and will be led by repeated testimonies of medical practitioners to reconsider its views.

The World Power Conference.

The Second Plenary Meeting held at Berlin.

By OUR SPECIAL COMMISSIONER.

No. 2.*—*Extracts from, and comments on, some of the papers submitted and discussed during the second and third days.*

THE second day's proceedings started with two simultaneous meetings, one on "Electricity in Crafts and Industry," Section 2, at which 14 papers were presented, the other containing 15 papers on research, Section 32.

Roughly speaking, the papers presented to Section 2 can be divided into seven sub-sections. The first of these sub-sections deals with radio (Paper 303), but not in the proper sense of the word: it discusses the question of power supply to radio stations, and deals with the permissible voltage and frequency variation limits, and the treatment of transformer and cable problems.

Electric motors form a second class (Papers 44 and 274). The two papers presented deal with the application of electric motors to various industries. Paper 274 gives a fairly general survey of the tendencies that are becoming apparent, more particularly in Germany.

It may be stated that there is a definite tendency to develop the squirrel-cage motor up to greatly increasing outputs. Low-speed squirrel-cage motors have been built up to outputs of 2,000 kW for direct coupling to the line. This is made possible by the use of special rotor construction of the eddy-current or double-bar type. With very few exceptions, no difficulty has been experienced with insufficiency of starting torque, and a starting current of from 3 to 5 times the rated current does not appear to have caused any trouble.

Three-phase supply for winding engines has been perfected, and it is claimed that three-phase equipments have now attained to the same degree of security and ease of operation as can be claimed for d.c. Many cases of increased pit production by the extensive use of modern electric drives are cited.

The modern tendency appears to continue along the lines of the increasing use of individual drives, leading to the general use, where possible, of built-in motors. Many problems connected with the inter-relation of speeds of different motors working in conjunction with a given plant have arisen. Satisfactory solutions have been found, particularly in the paper-making industry. Similar problems occur in rolling mills, and endeavours are being made to avoid the cog-wheel drive, substituting for it separate synchronous drives for the two rolls.

The application of motors in the building trade (Paper 274), although of general interest, is based more particularly on American conditions, where the height of lift becomes a predominant factor in the financial saving that can be made by the application of electric power. There again three-phase motors are available and are gradually superseding d.c. drives.

Electrical precipitation of solids and liquids contained in gases was mentioned in one paper (415) in Section 2, but was again dealt with under another heading in Section 7, which is connected chiefly with smoke abatement, as distinct from the recovery of commercially valuable products on the one hand and the purification of gases on the other.

Two papers (51 and 305) deal with the question of industrial lighting. The principal points of interest in both papers are the resulting increase of production and freedom from accidents which can be directly traced to better lighting conditions. The work of the E.D.A. has already shown what can be achieved in this direction. The data and information published by it during its factory lighting campaign show that Great Britain was one of the first to realise the value of this important application of electricity.

Three other papers (46, 95, 274) deal with the extension of electric welding. The first paper emanates from Germany, the second from Austria, and the third from the U.S.A. Paper No. 274, on welded steel buildings and bridges in the United States, is particularly useful in this respect and gives details of some very interesting work that has been carried out, and also provides information in connection with costs. The same remarks apply in a rather lesser degree to Paper 95, whilst the main point of interest in Paper 46 is the development of the automatic feature in arc welding, by which it is hoped to improve the consistency of welded seams.

Industrial heating has received quite a large amount of attention. In this case Paper 195 contains some interesting diagrams showing the maximum current charges below which electric heating becomes a commercially profitable proposition.

Four papers (43, 143, 223 and 227) from four different countries: Germany, Italy, Japan, U.S.A., give some detailed information on the electro-chemical industries in those countries. It is rather surprising to note that the Italian consumption of energy for chemical purposes (2,000 million kWh per annum) is larger than the corresponding amount (1,700 million kWh per annum) used in Germany.

Section 32 is devoted to research work, but it proved to be disappointing to a number of engineers. The section actually dealt with one or two subjects upon which research work has been carried out, and resulted in a very patchy contribution ranging from heat transmission to wind energy; but did not contain any communication connected in any way with electrical research. The organisation of research work was not touched upon from any quarter. One would have thought that the international organisation of research work would have received a great deal of attention, more particularly with a view to formulating some kind of international agreement concerning the methods of measurement. There evidently still remains much room for improvement in this direction, which would have at least a tendency to make the results of researches in different countries more easily comparable.

Section 33 deals with standardisation problems and the rationalisation of statistics. The paper presented by Mr. C. le Maistre on the "British Standardisation Movement and its Public Significance" is very favourably reviewed by the general reporter of this section. Three fundamental requirements are laid down in the paper, and the discussion, so far as it goes, does not appear to have anything to add to the author's conclusions.

* For No. 1 of this series see ELECTRICAL REVIEW, June 27th, 1930.

The three requirements are: (1) that a recognised need for standardisation shall exist; (2) that the producer and consumer shall be prepared to collaborate; (3) that the necessary funds to carry out standardisation shall be ensured.

It is unnecessary to dilate upon the benefits of rational standardisation, particularly when periodical reviews are made to prevent the existing standards from becoming out of date, as is done by the B.E.S.A. In their summing up, the general reporters have expressed the generally-accepted view, which may be equally well applied to many other questions: "The World Power Conference cannot deal with specialised questions relating to standardisation. Its mandate does not go beyond handing the question over to competent bodies."

So far as the rationalisation of statistics is concerned, the papers presented and the discussion leave a very distinct impression that it is universally recognised that the value of statistics depends upon the standardisation of the methods used in compiling the figures. One moot point that arises from the discussions is whether statistics should be compiled in such a way as to be within the grasp of the general public, or whether they should be kept on strictly scientific lines. That there is always a certain amount of danger in the use of statistics could not have been better illustrated than by the incident that occurred between Mr. Sackett, the American Ambassador, and Mr. Insull relative to the difference between the cost of production per kWh and the price to the consumer.

At the conclusion of the technical meetings, Professor Dr. D. Serruys (France) gave a general address in the auditorium of the State Opera House on "The New Forms of Rationalisation." The address in itself is a concentrated extract of economic common sense. It passes in review the evolution of the various phases of relationship between the financier, economist, and producer, and is a very able analysis of the economic conditions that have prevailed in Europe over the last fifteen years. Rationalisation is treated from the over-all efficiency aspect, and it explains very clearly the relative positions of the three main constituents of the future economic aspect of the world market. It is an interesting study of how a large portion of the "rest of Europe" is thinking, and, throwing as it does quite a good light upon the industrial political economy of Europe, it is well worth reading.

Section 3, which opened the third day's proceedings, dealt with "Three-dimensional Load Models and Current Tariffs." Seven papers were presented in this section, including two from the U.S.A., two from Germany, one from Denmark, one from Japan, and one from Sweden. Improvement of load factor seems to be the pre-occupation of all the authors of the different papers, who advance a number of different proposals to that end.

Power factor improvement is discussed in Papers No. 117, No. 278, and No. 279. The conclusion is drawn that the fixed charges per kWh decrease rapidly with better power factor, whereas the operating charges are only slightly increased. Very little information is given, however, on the methods employed to raise the power factor. Paper 117, presented by Japan, deals very fully with the power factor clauses in use in that country, and puts forward suggestions for standardised clauses. Although a great deal of investigation work has been done in Europe in connection with this question, and several very fully detailed reports have been published, the question did not seem to arouse much European interest during the discussion. One point of interest that can be made is that difficulties are anticipated in the application of penalty clauses regarding power factor, which is not understood by the majority of consumers; another way of doing the same thing is suggested, and consists of fixing a tariff on a certain power factor basis, at the same time offering a bonus for power factors above the fixed figure. The advantages of the latter method are that it facilitates the relationship between supplier and consumer, and that reactive volt-amperes can be supplied to the system at points where they are most required.

Equalisation of load is the object aimed at in the majority of papers presented in this section, the methods suggested are of widely different characters, and depend largely on local conditions. The most common method adopted is the fixing of tariffs in such a way that consumers may be attracted to use more power in the "off-peak" periods. Experience has shown that very great care has to be exercised in fixing these tariffs, as cases have occurred in which the demand created by this method has actually resulted in shifting the peak from one particular time to another.

The general tendency in the development of tariffs shows that single tariffs do not appear to meet the case. The multiplicity of tariffs proposed cannot but result in the complication of meters, increased cost of installations, and loss of goodwill of the consumer, who cannot possibly be expected to understand complicated calculations of different quantities of the same goods supplied at different prices, according to quantity, time, or other technical expressions of which he has probably never heard. The discussion on these papers unfortunately did not throw much new light on a very complicated problem. The solutions put forward were, if anything, in excess of the number of speakers, which is very largely acounted for by the fact that tariffs must necessarily depend to a great extent upon local conditions, and also, within limits, upon the type of supply station under consideration.

Power supply on ships is covered by Section 27, and from the electrical point of view deals mainly with auxiliaries and signalling apparatus. Electrical drives are discussed in only one paper (No. 21), which draws the general conclusion that much remains to be done in this field in order that the cost and weight may be reduced to make electrical drives competitive.

Individual problems of power supply in different countries were dealt with in Section 22. Although this section does not specify any particular form of power supply, the ten different papers all deal with large-scale generation and transmission of electrical energy. The tendency all over the world is to centralise generation and to transmit the energy over a national "grid."

That the resultant problems are all of the same nature is reflected in every paper. The three most important questions are: (1) electrical stability, owing to the large capacity of inter-connected systems; (2) the increasing requirements in circuit-breaker capacity and speed of operation; (3) the economic limiting size of generating plant. The papers cover widely separated countries, all of which show an increasing electrical development much on the same lines.

Latvia is to erect two hydro-electric stations at Riga of an aggregate capacity of 152,000 kW, which will be inter-connected with four existing thermal stations, the aggregate capacity of which will be incresaed to 90,000 kW. The total length of overhead transmission lines will be approximately 1,000 miles, partly at 60 kV and partly at 100 kV. The development of water power will provide an available generating capacity of 593,000 kW; auxiliary power stations having a total capacity of 230,000 kW, mainly using peat as fuel, are projected. The estimated consumption in 1950 is 540 million kWh, which will require an installed capacity of 225,000 kW.

In Russia in 1922-23 the total length of high-voltage transmission lines was 906 km, which was increased to 3,378 km in 1928-1929. During the same period the average increase in power generated was about 22 per cent. At the end of 1929 the total capacity of capital stations was 892,000 kW, with a further 2,586,500 kW under construction. By the end of 1933 it is estimated that 26,000 million kWh will be generated, of which 73 per cent. will be supplied by the group of State power stations. The capacity of the State stations will be 5.3 million kW, and the total capacity of all stations 7.7 million kW. The total length of high-voltage transmission lines will then be 16,000 km. (approximately 10,000 miles).

Talking Pictures.—II.*

The principles of recording and reproduction, with comments on the respective features and advantages of the "Vitaphone" (disk) and "Movietone" (film) systems, both recognised to be among the leading ones in use to-day.

By C. M. R. BALBI, A.M.I.E.E., A.C.G.I.

The Western Electric Light Valve.

A photograph of the light valve invented in 1922 by Mr. E. C. Wente, of the American Bell Telephone Laboratories, is reproduced in fig. 10. Essentially, it consists of a loop of "Duralumin" tape suspended in a plane at right angles to a magnetic field. The tape,

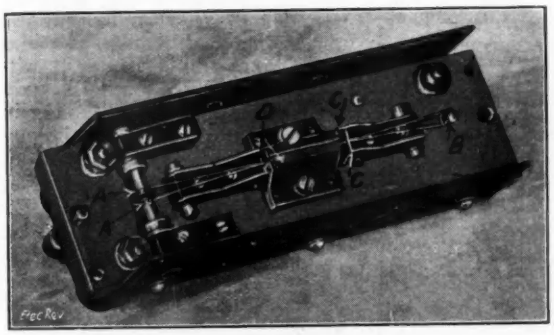


Fig. 10.—Western Electric Light Valve.

6 mils wide and 0.3 mil thick, is secured to windlasses A and A^1 and stretched tight to form a slit 2 mils wide. Viewed against the light, the valve appears as a slit 2 mils by 256 mils in size.

When one side of the wave opens the valve to 4 mils and the other side closes it completely, full modulation of the aperture is accomplished. The natural frequency of the valve is set by adjusting the tension applied by the pulley B; for reasons which involve many considerations the valve is tuned to 7,000 cycles per second. Under those circumstances about 10 milliwatts of a.c. power is required for full modulation at a frequency remote from resonance; about one one-hundredth of this power at the resonant frequency. The impedance of the valve with its protecting fuse is about 12 ohms.

The Robertson Vacuum Tube.

The Robertson recording tube is a 4-electrode compound vacuum tube (see fig. 11). The object of its construction is to reduce the modulating potential to as low a figure as possible by means of "induction" from an outer ionising tube. In this way the potential of the input can be reduced to a few volts, which is of advantage, as high-voltage step up transformers for this purpose are difficult to design and have a tendency to break down. A potential is applied to the terminals A and B until tube X strikes and tube Y is on the point of striking; then the modulated input is applied at C and D with a polarising voltage of about 30 volts.

With this recording tube it is found in practice that the terminals C and D may be connected to the output of the last valve of the amplifier without any transformer being required. That is to say, it will take the same position in the circuit as a loud-speaker does in an ordinary broadcast radio-telephone receiving set.

The luminosity of a light-recording tube in relation to the current has recently been determined for the author at the National Physical Laboratory, a very interesting field for investigation in this direction being indicated by the results obtained. The advantage of the vacuum-tube system is that the inertia of a gas is practically negligible and the recorder, having no moving parts, is strong and less likely to get out of order, in comparison with other delicate apparatus, such as the oscillograph or the light valve.

* For Part I, see ELEC. REV., June 20th, 1930.

Reproduction.

Whatever system is employed, the art of reproducing by light is the same. The film is developed and striations, or contours, are brought out into relief. They are negative when developed and a positive is obtained when the film is printed.

Light-sensitive cells are another feature common to these systems, and require careful consideration. As used in talking-picture reproduction work they fall into two classes:—(1) The selenium cell and (2) the photo-electric cell. Their function is to convert the fluctuations of light intensity falling upon its surface into a corresponding electric current.

A photo-electric cell of the type shown in fig. 12 has such characteristics that when it is polarised by a suitable voltage in the circuit, as shown in fig. 13, and is used within proper circuits, the current through it is proportional to the incident light.

It is to be noted that the polarising voltage is supplied to the photo-electric cell through a very high resistance; there is, therefore, obtained across this resistance a voltage that is proportional to the light falling upon the cell, which accordingly bears a direct relation to the varying density of the sound track interposed between the exciting lamp and the cell.

The photo-electric cell circuit is inherently one of high impedance; in such a circuit there are two matters which require attention:—(i) Local interference is most readily picked up and at this point, when the energy level is low, such interference may be appreciable, in comparison with the sound currents themselves; (ii) also the shunting effect of capacity between the electrical conductors becomes noticeable, particularly at the higher frequencies. Hence a valve amplifier, which serves both to increase the energy and to make that energy available across a

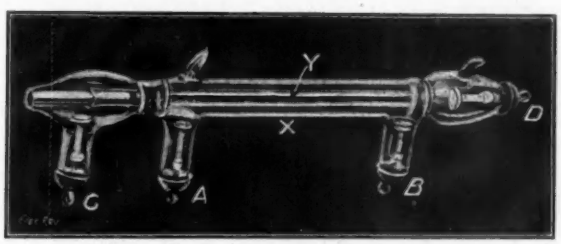


Fig. 11.—Robertson Vacuum Tube.

low-impedance circuit, is usually associated with the cell.

The selenium cell also possesses the property of converting light fluctuations in electrical ones, but, although this fact was discovered in 1817, the theory of its action is not yet understood. It has the disadvantage that a slight lag takes place in the reduction of its resistance when the light is increased in value, and there is a larger lag in its recovery when the additional illumination is removed.

A typical selenium cell is shown in fig. 14. The most sensitive selenium bridge is capable of detecting illumination of 10 to 9 meter-candles, which means that it is a hundred times more sensitive than the human eye. Fig. 15 shows the relation in ohms against foot-candles for a Fournier d'Albe cell.

The selenium cell has been generally abandoned in favour of the photo-electric cell on account of the former's response lag, but in the British Acoustic Film Co.'s system an electrical compensating circuit is stated to completely overcome this defect.

Essentials of Recording and Reproducing.

The audible frequency range of the normal human ear is from 20 to 32,000 cycles per second, although in practise a full range of sound reproduction is not necessary for this work. For good reproduction a frequency range of 50 to 5,000 cycles is required; however, after the range has been increased from 30 to 8,000 cycles per second the average listener is unable to detect any further improvement when the range is increased still further.

That wide frequency range has now been very nearly achieved in practice, but there are other conditions besides this that have to be fulfilled before perfect reproduction can be obtained, and when great changes of sound intensity are met with, as in talkie picture reproduction, the question of efficiency is a very important one. Most apparatus, especially the loud-speaker, becomes more efficient as the input is increased; hence it will be appreciated that here is a source which can give rise to very large distortion. For instance, in the theatre and pay for seats. The film play may be required to give them a reproduction of sound from whispered speech to a pistol shot at close range. In one case the voices must be distinct, but not like someone shouting, and in the other the shot must be recognisable as a shot.

The minimum audibility of a person occurs when the pressure change falls below 0.001 dyne per sq. cm., but one cannot work near that limit. A person at the back of the hall wants to hear equally as well as a person in front; so does the person of slightly subnormal hearing. The latter case, in fact, affords an excellent example, which brings about an important point of view. The man of slightly subnormal hearing says to himself: "I can hear a whisper, if a person is whispering into my ear like the man is doing on the film, so that I should be able to hear him too." He forgets the inverse square law of sound (for directional projection) and that the loud-speaker may be many feet from his ear. In consequence the right strength of a whisper for this man may seem to be a shout to the man of perfectly normal hearing, and it is most difficult to strike the happy medium.

The psychology of most persons while listening to a talking picture is that of an invisible third party on the screen. Thus, if there is a conversation between two persons seated in easy chairs in a small room, the listener will unconsciously imagine himself to be an unseen witness sitting between the two speakers, and he will expect to hear accordingly. In reality, he may be listening in a huge auditorium whose acoustic characteristics are vastly different from those of the small room in which

Fig. 12.—Photo-electric Cell ("Eye").

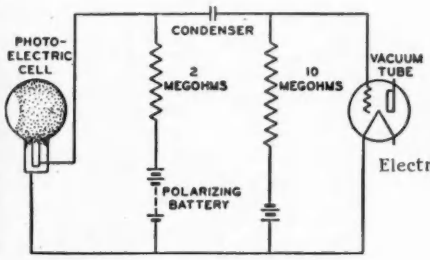


Fig. 13.—Polarisation Circuit.

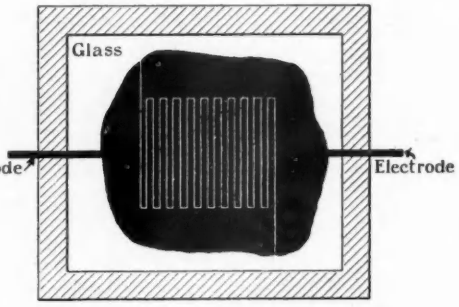


Fig. 14.—Typical Selenium Cell.

relation shown in fig. 16, which was determined by Dr. A. H. Davies, of the N.P.L., the acoustic response of a loud-speaker for a current of 10 milliamperes is greater than the response for 2 milliamperes by approximately 20 per cent. more than if the relation had been a proportionate one. It may be desirable to point out that acoustic amplitude per unit-current represents efficiency to an arbitrary scale.

Phase lag is another source of error; that is to say, the inertia of a loud-speaker diaphragm, or such-like instrument, increases with the frequency (*e.g.*, fig. 9, which is an illustration of a Western Electric Co. oscillograph's distribution of response and phase lag against frequency).

These three sources of error (unlinear response, ununiform efficiency, and ununiform phase lag) are the only ones the Western Electric Co. seems to admit,[3] but the author's contention is that even uniform phase lag can be the cause of very obvious distortion, if the lag is pronounced. Imagine a system wherein the time required to reach the maximum amplitude is one-hundredth of a second; then, even if the efficiency and response were uniform at all frequencies, such a system would produce absolutely distorted results.

Acoustics.

The acoustics of a talking picture from a reproduction point of view are especially difficult. The engineer and producer have to consider the reproduction from the point of view of the psychology of patrons who go to the listener imagines himself to be. We unconsciously accustom ourselves to expect differences in sound according to our surroundings. For instance, it is quite easy for a blind-folded person to tell if he is out of doors or in a room when he speaks or hears a spoken voice. Too much emphasis cannot be laid on this point; for example, blind persons become most adept in avoiding obstacles by sound reflection, and an experienced blind man will hardly ever walk into a wall.

Now the listener subconsciously expects those effects, and when he does not hear them he wonders what is wrong with the talkies. This effect is far less pronounced directly the auditorium is made comparatively small, say, of 10,000 cubic feet. The point is, can large halls be designed to give the illusion of natural sound throughout the auditorium?

No one will doubt that the apparatus used for talking-picture reproduction is made as perfect as possible, and yet the public compares the reproduction unfavourably with that of a gramophone or wireless telephony set. The pioneers who introduced the talking picture were familiar with the theory and practice of gramophone and wireless apparatus design, and talking-picture apparatus was developed in laboratories where all the accessories relating to the gramophone and wireless set were ready to hand. Why then is it usual that the quality of reproduction should not come up to the standard of these modern domestic appliances?

In attempting to answer that question it must be explained that when the experimental talking apparatus was developed to a commercial stage its manufacturers naturally wished to try-out their invention as quickly

[3] Harvey Fletcher, "Speech and Hearing."

as possible and with as little further outlay as need be. It can therefore well be understood that talking-picture equipment was installed in kinemas where silent films were customarily shown, irrespective of whether the hall was acoustically suitable for a sound-reproducing installation or not. The building of new halls would have involved too much delay, and would hardly have been justified when making a "try out on the public."

The talking equipment is an expensive item, and it can therefore be understood that it was the big kinema proprietors who were the first to take it up, which was unfortunate, as I will attempt to show, for, other factors being equal, the smaller auditoriums would have proved better suited to sound reproduction. Consider the matter by way of an example: at a lecture in the Albert Hall, that vast auditorium of nearly 3,000,000 cu. ft. capacity, the author was very surprised when listening from the top gallery to hear a thin reedy squeak totally different from the lusty voice of the speaker, with whom he was acquainted. If there were a film projection at the Albert Hall to-day with a voice accompaniment, the audience would not expect a thin reedy squeak from the animated object on the screen, but would subconsciously ignore the distance involved and expect the tones of a man a few feet away. That is the question of psychology referred to before, and no attempt to explain it will be made.

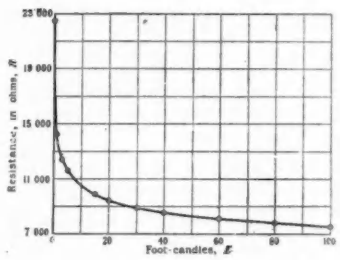


Fig. 15.—Selenium Characteristic Curve.

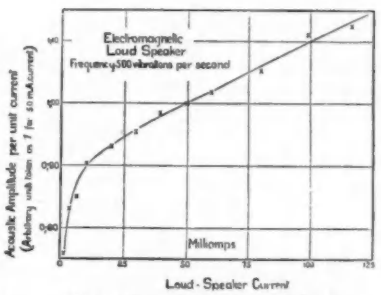


Fig. 16.—Response Relation.

By considering such a very large hall as the Albert Hall the reader will begin to appreciate where the theoretical difficulties of this matter lie. Any endeavour in such a case to take advantage of the powerful amplifying gear that is now available for such purposes to magnify the voice many thousands of times till its intensity at the point where the listener is sitting is equivalent to the intensity of a normal voice a few feet distant would be checked by another problem of acoustics, namely, reverberation. This branch of acoustics has been most ably explored[4]; roughly it has been shown that sound is flung backwards and forwards until it is gradually absorbed, and that the louder the actual sound the longer it takes to die away; also that when the acoustics of a hall are bad, clarity is not gained by raising the voice, but only by speaking more slowly. If this is not done, words will overlap one another and the general result will become muffled, which is what usually happens now in talking kinemas.

The growth and decay of the sound intensity for syllable emission in a room of too small an absorbing power is indicated in fig. 17; in this case about 60 per cent. of the sound heard is due to previous syllables and only 40 per cent. to the syllable actually uttered; moreover, the variation in intensity due to discontinuous articulation is only a small percentage of the total intensity, conditions which inevitably mean indistinctness. Fig. 18 shows the effect of speaking at half the rate under the same conditions, while fig. 19 shows the growth and decay of sound intensity of syllable emission in a room of correct absorbing power.

Now, one cannot be expected to make a talking picture operate more slowly in a big hall than in a small one to suit the acoustics of the particular building, and therefore wherever a talkie film is projected in a big hall at a greater sound intensity than that of the normal voice there is likely to be a serious loss of naturalness in the reproduction. The acoustic design of an auditorium is therefore very important, especially when it is realised that one's judgment of the degree of perfection needed in sound reproduction systems is changing and growing more critical every day.

The problem of the best conditions for the sound reproduction of talking pictures in large auditoriums has yet to be dealt with. Certain fundamental criteria must be satisfied: the first is an adequate loudness level, and the second is the uniformity of that level. The first condition can now easily be obtained, but the second involves the correct application of acoustics.

The optimum loudness level for talking-picture theatres has been fixed by experiment, but it has only recently been discovered[5] that approximate uniformity of loudness level is obtainable and that this condition is arrived at when the reverberation period for the auditorium is an optimum value. Loudness level and reverberation period are related, since loudness as interpreted by the ear is directly proportional to the energy at the source and inversely proportional to the total absorption of the auditorium.

It should be remembered that an auditorium is only the final factor in a system of reproduction and one must take into account the acoustics of the sound theatre. To obtain to some extent the illusion of room acoustics a fair proportion of reverberation is admitted into the recording system, and it has to be taken into account when determining the optimum reverberation period for the auditorium concerned. When those conditions have been satisfied a very fair illusion of animated scene and sound reproduction can be obtained.

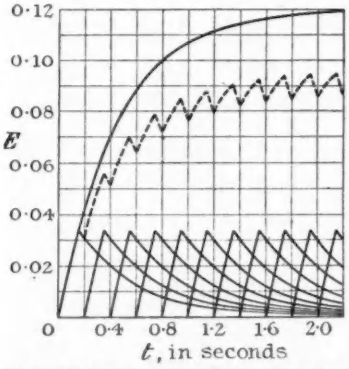


Fig. 17.—Incorrect Intensity Growth and Decay.

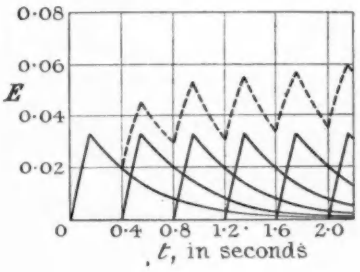


Fig. 18.—Effect of Speech Rapidity.

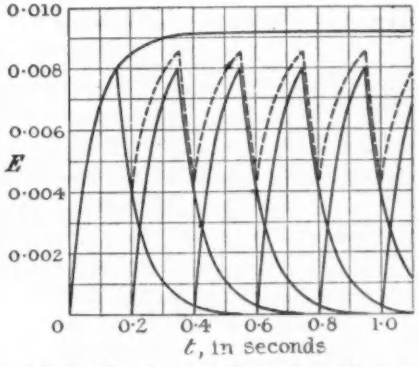


Fig. 19.—Correct Growth and Decay of Intensity.

(4) Summerville, *Journal* of the I.E.E., March, 1924.

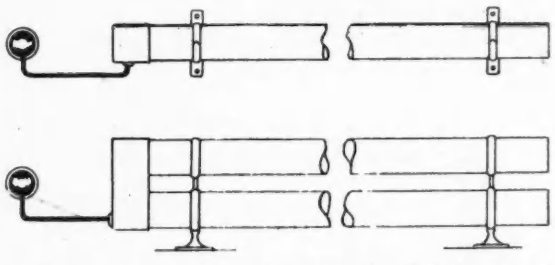
(5) This important discovery is due to a member of the English engineering branch of the Western Electric Co.

Electricity for the Home.

Selections from Recently Introduced Manufacturers' Products.

A Low-temperature Heating System.

A low-temperature system of heating by the SEBUT MANUFACTURING CO., 36, Chapel Road, West Norwood, S.E.27, employs " Sebut " tubular heaters. These are constructed with an outer casing, electrically welded, of 18 s.w.g. steel tube, 2 in. in diameter, one end of which is finished off with a steel cap, and the other with a polished brass cap which, when removed, gives access to the terminals. The heating core is removable, and is built up on two steel rods which run the whole length of the heater. The heating spiral is supported on mica disks, and it is impossible, it is claimed, for the spiral to come into contact with the sides of the tube. The earth terminal is in direct contact with the outside casing, thus making a good earthing arrangement. The terminal cap is arranged to take either cable or conduit. The heaters are manufactured in lengths varying from 2 to 17 ft., rising in 1-ft. stages. The loading of the heating spiral is 60 watts per ft.; other loadings such as 40-50, and up to 70 and 80 can be arranged for if required, and the surface temperature of the tube varies from 105 to 225 deg. F., according to the loading



Figs. 1 and 2.—" Sebut " Heaters for Skirting-board and Floor Fixing.

required. The tubes may be installed in any required position, but generally along the skirting board or the edge of the floor, where they are held in position by pipe clips, figs. 1 and 2. Where the heaters are incorporated in the plans of a new building it is frequently found more convenient for the tubes to be recessed or fitted below the level of the flooring and surmounted with a perforated grating.

Where there is already an existing heating system, such as hot water, and there is a down draught present, a " Sebut " heater can be installed in such a manner as to eliminate this. The heaters may be adapted to a variety of purposes, from the heating of a linen cupboard to that of large buildings. The standard finishes for the tubes are black enamel and aluminium.

Novel Electric Radiators.

SOAPSTONE PRODUCTS CO., Terminus Chambers, 6, Holborn Viaduct, E.C.1, have placed on the market some electric radiators made of a special stone, known as soapstone, a highly refractory material quarried in the north of Sweden which contains a high percentage of silica and magnesia. The radiators are primarily of two types, one with a visible glow, and the other with the elements entirely surrounded by soapstone. The stone possesses the unusual property, it is claimed, that when it is heated it retains the energy for a long time, gradually giving it out, so that rooms may be kept at an even temperature for a small consumption of energy. The totally enclosed models Nos. 125, 128 and 165 are, it is claimed, absolutely fireproof, there is no risk of shock, as no live parts are exposed, the stone itself having high insulating properties. The

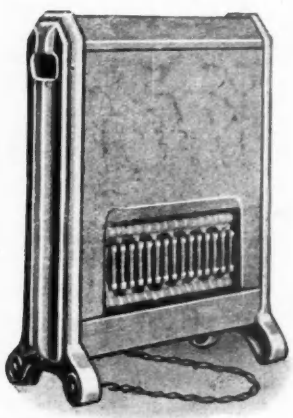


Fig. 3.—1-kW Visible-glow " Soapstone " Radiator.

radiators are made in 1-kW, 2-kW and 10-kW capacities, the smaller radiators being designed so that the loadings can be reduced for one-half and one-quarter of full consumption. The soapstone used has been tested up to a temperature of 2,912 deg. F., and it tends to harden after use. In its natural state it is very soft, so that it can be easily carved and shaped to give the finished

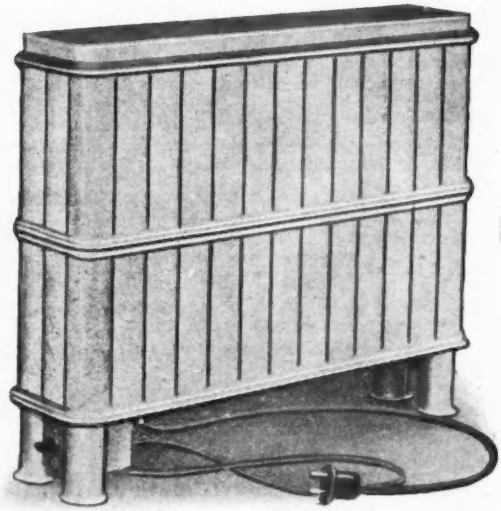


Fig. 4.—Non-visible Glow " Soapstone " Radiator; 2 kW.

radiators a decorative and pleasing appearance. Fig. 3 shows a " Soapstone " radiator of the visible-glow type which has a maximum loading of 1,000 W. Its dimensions are 18½ in. high by 14 in. long by 4½ in. deep. The net weight is 75 lb. Fig. 4 depicts a 2-kW model of the

non-visible glow type. This is constructed of turned pillars of soapstone, which increase its radiating surface and give it a pleasing finish. The overall dimensions are 20½ in. by 24½ in. by 7 in. The net weight is 253 lb.

Improved Electric Irons.

The "C.E.A.L." and "Patent Point" domestic electric irons of COVENTRY ELECTRICAL APPLIANCES, LTD., Conduit Works, Fleet Street, Coventry, have

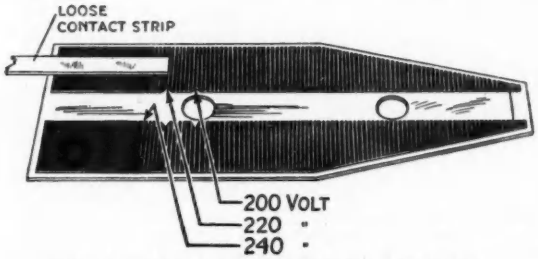


Fig. 5.—The "Multivolt" Iron Element.

recently been subjected to two interesting improvements. One is a double thumb rest, one on each side of the handle, and the other is the "Multivolt" iron element by means of which the length of the element strip can be varied to suit five different voltages from 200 to 250; fig. 5 depicts the arrangement. The loose contact strip is laid over a few of the end turns of the element, according to the voltage for which the element is required to be adjusted, and as indicated by the notches. The clamp plate holds the loose strip in the correct position when it is secured by the clamping bolts.

New Lighting Fittings.

The accompanying illustrations, figs. 6 and 7, show two attractive electric light fittings which have recently been introduced by Messrs. HAILWOOD & ACKROYD, LTD., Morley, near Leeds. Fig. 6 is a wall bracket in the modern style which has cast-metal supports into which are fitted three tinted glass panels bearing artistic sand-blast designs of vine. At the base is a cast and chased mask of Bacchus. The bracket is backed by an aluminium reflector.

The six-light octagonal pendant fitting, fig. 7, is composed of delicately-tinted glass panels, in the form of conventional vine leaves, supported by chased ornamental metalwork. The grapes suspended from the

Figs. 6 and 7.—New "Hailwood and Ackroyd" Lighting Fittings.

square ceiling plate are illuminated by a bulb and add an original feature to the fitting. The panels and metalwork may be supplied in any desired finish.

A New Floor Polisher.

The GENERAL ELECTRIC CO., LTD., Magnet House, Kingsway, W.C.2, has recently marketed a new electric floor polisher which is described as light in weight, strong in construction, and very easy to handle. The new "Magnet" appliance, fig. 9, produces a rich glossy surface which far surpasses, it is claimed, the results obtained by any other methods of polishing. The application of the polisher is not confined only to wood or parquet flooring, but gives equally advantageous results on any of the various compositions now popular as floor coverings. Two sets of brushes are provided with the machine, one for spreading the polish or wax evenly over the floor, and the other for finishing. The brushes for spreading the polish are made of the best bristles, while horse-hair brushes of high quality are fitted for polishing. Both sets are interchangeable and can be instantly detached. A rubber cushion is fitted round the edges of the machine to obviate any damage to furniture or wood work with which it is liable to come in contact. The motor is fitted with ball bearings and requires little or no attention.

A Small Electric Fire.

A recent introduction by DOMESTIC ELECTRIFICATION, LTD., Townsend House, Greycourt Place, Westminster, S.W.1, of "Dolphin" domestic apparatus, is the "Ashley" 1-kW fire depicted in fig. 8. Although small in size this

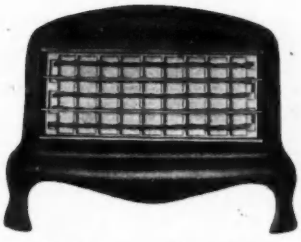


Fig. 8.—The "Dolphin Ashley" 1-kW Fire.

Fig. 9.—"Magnet" Floor Polisher.

appliance is claimed to possess the sturdy constructional features of the larger apparatus. It is claimed to be particularly suitable as a portable heater, and it can be supplied in a variety of attractive finishes.

Electric Cookers in Schools.

At a meeting of York Education Committee recently it was stated that electric cookers had been installed in four of the committee's schools, and it was recommended that similar provision be made at eight domestic science centres. It was complained that adequate use was not being made of the electric cookers in the schools, and a resolution was moved that a circular be sent to all teachers stating that the use of electricity must be properly taught in all schools.

The Electrical Association for Women.

On June 4th members of the Electrical Association for Women visited the Wimbledon Corporation electricity works and showrooms, and were much interested in a talk by Mr. McKenzie, chief engineer and manager, on "What Wimbledon is doing to introduce electricity into the home."

On June 17th members of the Birmingham and Midland branch spent an instructive afternoon at the Ham's Hall power station as the guests of the Birmingham Electric Supply Department.

Members of the Edinburgh branch were entertained at Elibank on June 21st, by their branch president, Viscountess Elibank, J.P.

The National Physical Laboratory.

A brief account of some of the experiments in course of execution, and apparatus on view, on the occasion of the annual inspection by the General Board.

THE annual visitation of the National Physical Laboratory took place on June 27th, the visitors being received by Sir Ernest Rutherford, president of the Royal Society and chairman of the Board, Sir Richard Glazebrook, chairman of the Executive Committee, and Sir Joseph E. Petavel, director of the Laboratory.*

Tea was served in the main aerodynamics building and of the varied apparatus viewed in the several departments the undermentioned attracted particular attention.

Fuses.—The testing of household fuses has recently been discussed with the British Engineering Standards Association, and the Laboratory facilities have been increased to cover the tests prescribed in the latest B.E.S.A. specification for domestic fuses rated up to 100 amperes carrying capacity, with a 0.5-ohm earthing resistance in circuit. Advantage has been taken of structural alterations to the building in which the battery used for the purpose is situated to provide better accommodation for these tests. Additional cells have been added to the battery, increasing the voltage from 240 to 260, and a special switch for applying short-circuit currents to fuses has been installed, the current being capable of reaching 6,500 amperes for testing the largest fuse of this class.

Meters.—Integrating meters tested on behalf of the Electricity Commissioners last year revealed a serious source of trouble in the wear of the pivots and jewels of the motive part, which commonly rotates at 40 revolutions per minute at full load. In this connection, it is anticipated that the information obtained in the research on pivots and jewels which has been carried out at the Laboratory during the past few years will be of considerable assistance to manufacturers. Another defect of importance is the want of constancy of the permanent magnets used for regulating the speed of the meter by eddy currents. In more than one instance these magnets have been found to weaken appreciably in a few months, permitting the meter to run unduly fast. These defects can only be determined by extending the meter tests over a period of several months, a procedure which it has been found necessary to adopt.

Electrical Accelerometer.—Road research for the Ministry of Transport has included vehicle wheel-size and impact investigations, and necessitated the measurement of two linear accelerations and one spring load in such a manner that the three records can be accurately synchronised, which can only be satisfactorily achieved by making the instruments record remotely upon a common chart, or photographic film. In devising an electrical method of remote control, hysteresis error proved to be too great to permit the use of a pile of carbon disks similar to the McCollum-Peters electric telemeter, but an ingenious alternative, which has produced good results in its experimental form, comprises a variable iron-cored mutual inductance with primary windings energised with a.c. of constant amplitude and frequency, the secondary windings voltage output being electrically filtered and rectified and recorded by a d.c. oscillograph. A mass, comprising two laminated armatures and clamps, is suspended on two flat steel springs clamped at the ends of one diameter to the mass, and at the ends of another diameter (at right angles to the first) to the frame of the instrument. The planes of the two springs are separated by a distance equal to about one-third of their diameter, and hence the mass is elastically mounted with one degree of freedom. Each armature is separated by a small air-gap from a laminated U-shaped "Stalloy" core, carrying primary and secondary windings on both limbs. The force necessary to accelerate the mass is transmitted through the springs and their resultant deflection causes an increase in one air-gap and a corresponding decrease in the other.

The two primary windings are in series across a 1,000-cycle a.c. supply given by a valve-maintained tuning fork and amplifier. Each secondary winding is connected to a mesh of four copper-oxide rectifiers arranged to give full-wave rectification, and the d.c. outputs from these two meshes are passed through the loop of the oscillograph in opposite directions. The balanced arrangement has two advantages additional to those of increasing the sensitivity and rendering the calibration curve more nearly linear. It results in the total primary inductance being independent of the position of the double armature (assuming that the two magnetic systems and windings are similar), and allows the rectifiers to be operated with a larger output current, when their equivalent internal resistance is smaller and more constant, without an auxiliary arrangement for setting back the zero of the oscillograph. Since an accelerometer will only give accurate readings at frequencies well below its own natural frequency, and the actual displacement of the mass is inversely proportional to the square of that frequency, the value chosen must clearly be a compromise. The simple form of the springs adopted renders it easy to change the natural frequency, and its actual value will be determined experimentally; it is anticipated that it will be of the order of 300 cycles per second. Provision is made for damping the instrument by enclosing it in a casing which can be filled with oil. Two methods are available for calibrating the accelerometer, one static, the other dynamic. For the first, the instrument is inverted and the reading noted. It is then erected, and an upward force applied to the suspended mass sufficient to give the same reading as was obtained in the inverted position. This force is equal to twice the equivalent weight of the mass. The instrument can then be calibrated in terms of gravity by applying to the mass upward and downward forces increasing in steps equal to this equivalent weight. The second method consists in mounting the instrument on a piston, the acceleration of which can be calculated from a knowledge of the speed and throw of the associated crankshaft and the length of the connecting rod.

For the housing of the equipment a van body having two compartments has been constructed on a trailer chassis. The larger compartment housing the oscillograph is a dark room, so that it will be possible to develop the records while out on the road. The front compartment has a fire-proof lining and houses a twelve-volt petrol-electric generating set for driving the motor of the oscillograph, the interior illumination, the valve filaments of the tuning fork and amplifier units, and (through a motor-generator set) for the high-tension supply. It is proposed to compare the results obtained over both artificial obstructions and normal road surfaces, using different types of tire and sizes of wheel.

Electrically-welded Chain.—Most chain used for lifting gear, haulage purposes, ship cables, &c., is a hand-made product in which wrought iron is welded by a smithing process. A certain amount of chain is, however, made by machines, the welding being electrical, so far as is known the largest size made by the latter process being of ¾ in. diameter stock. Comparative tests to destruction on samples of machine-made chain and good quality hand-made chain of the same size have proved that the machine-made chain emerges very favourably from the tests, its resistance to shock loading being excellent.

Standards of Radiant Energy.—The measurement of the total energy radiated by hot bodies has of late years become of increasing importance and the N.P.L. and other national laboratories are endeavouring to establish standards of total radiation. One of the objects of this work is to enable electric lamps to be rated and issued as standards of radiant energy for the use of scientific investigators, for calibrating thermopiles, bolometers, or other radiometers. Another object is to provide standards of radiation suitable for testing radiometric apparatus employed for meteorological work.

Spectrophotometry.—A new type of visual spectrophotometer exhibited is used to determine the transmission of coloured glasses for light of different wavelengths, *i.e.*, different colours. The transmission of a glass is obtained by balancing a variable beam of light against a constant beam, first when the glass is in and, secondly, when the glass is not in the constant beam. The reading of the voltage on the variable lamp enables the transmission of the glass to be deduced. The new features in the instruments are: (1) there are no moving optical media, and (2) the measuring scale of the instrument is graduated in terms of the voltage on the variable lamp. The precision is high, of the order of one half of one per cent. over most of the spectrum.

Resistances.—For several years it has been found difficult to obtain resistance wire having as low a temperature coefficient of resistance as is desirable, particularly for use in alternating-current measurements, where it is frequently necessary to construct resistors of small dimensions in order to reduce their inductance and capacitance. An alloy of copper and nickel can have a positive or negative temperature coefficient according to the proportion of the two metals it contains; at a certain composition the coefficient passes through zero value. In practice, however, it has been found very difficult to obtain supplies of material having a zero coefficient, the value being commonly negative, indicating an excess of nickel. The matter is further complicated by the fact that the annealing and drawing of the material into wire tends to make the coefficient more negative. The subject has been discussed with certain manufacturing firms, and, as a result, satisfactory supplies of wire have been obtained having a temperature coefficient not greater than ±0.00001, whereas previously values about 40

* An abstract of the annual report was published in ELEC. REV., June 13th, 1930.

times this were not uncommon. By constructing resistors of suitable proportions of wires having positive and negative coefficients, it is now possible to operate them at temperature rises of from 50 to 100 deg. C. with a change in resistance not more than about one or two parts in 10,000, which will be of assistance to the electrical instrument industry, in which a considerable proportion of the wire hitherto supplied has had to be discarded when constancy of resistance over a range of temperature has been of importance.

One of the first applications of this material has been to the construction of a potential-dividing resistance for 40 kilovolts for voltage-transformer testing. The resistances are wound on bakelite cards and a machine has been constructed for winding them automatically. Each unit consists of 80 cards of 2,500 ohms each, 40 for the auxiliary and 40 for the main resistance, and for the complete divider of six units 480 cards are required. An average of 12 cards per day can be wound by means of the coil winding apparatus.

Further experience has been obtained with the resistor of 0.00002 ohm constructed for the measurement of large direct currents. It consists of 40 water-cooled manganin tubes in parallel. As originally constructed there was danger of air locks occurring in the water system, allowing the possibility of excessive local temperature rise. Small leaks have therefore been introduced to permit of the escape of any air which may collect. The resistance was deliberately constructed so as to be a few per cent. low in value, and is now being adjusted by grinding the interior surface of the tubes. Though nominally rated at 7,500 amperes, it has proved so satisfactory that it seems likely that 20,000 amperes is within its capacity.

Business and Industrial Notes.

The Week's Electrical Trade News from all Sources. Commercial and Industrial Developments, Business Changes, Market Prices for Materials, Trade Openings, New Publicity Literature, Liquidations, and Failures.

"Electrical Review" Index.

The Index to Vol. CVI (for the half-year ended June 30th, 1930) is in course of preparation and will be published shortly. We shall be glad to receive the names and addresses of those who require it (free of charge) for binding purposes, or wish to retain it for reference. Application should be made as early as possible to the Publisher, 4, Ludgate Hill, E.C.4.

The Trade Press.

Though the proceedings of the recent Advertising Convention at Hastings were of general interest to general traders and all classes of newspapers and newspaper men, there was at least one paper which was of particular interest to those whose concern with the trade journals is more than that of an average everyday reader. We refer to the outspoken and thoughtful contribution entitled "The Service Expected from a Trade Journal" prepared by Mr. C. Pinkham, manager of the publicity organisation of the General Electric Co., Ltd. Mr. Pinkham's organisation is a very large one and its everyday relations bring it into contact with all classes of papers and all grades of newspaper representatives. Therefore he and his company have had excellent opportunities for forming well-considered opinions regarding trends and tendencies. The legitimate demands of the electrical reader upon the space of the ELECTRICAL REVIEW for recording matter relating to commercial, financial and technical developments of electricity are so great that we are prevented from following the author through the many interesting and controversial matters into which he led his hearers, but we wish to record our satisfaction with his views in justification of a policy of editorial independence in discriminating between matter submitted to the Press by advertisers and others. He holds, as do all large, and the majority of other, electrical manufacturing companies, that the insertion of an editorial "puff," "write-up" or "quid pro quo" ought not to play any part in deciding whether a trade paper should receive advertisements. In this respect he is reflecting the well-known policy of the ELECTRICAL REVIEW and indeed of all self-respecting editors who aim at keeping the standard of trade journalism high. The paper that runs on a lower level is bound in the course of time to lose the respect of its advertisers themselves, and that of its readers, and finally its own self-respect as well. Papers that have made it their constant aim to pursue a consistent policy of independence will welcome the declaration of conviction of the experienced advertising and publicity department of the largest British electrical manufacturing company in support of their principles, and will hope that the lead thus given in a time when the tendencies are somewhat retrograde will be more widely followed. Of course everybody of experience fully recognises that the doings and products of manufacturers and traders are a perfectly legitimate, and indeed an absolutely indispensable, part of the contents of an up-to-date and enterprising journal. But there is a line where the limit has to be drawn and that is where tact and experience are potent factors.

Glasgow Housing and Health Exhibition.

Glasgow Corporation is again organising a Housing and Health Exhibition to be held in the Kelvin Hall from September 24th to October 18th. Besides the usual exhibits of model houses, &c., there will be sections for lighting and labour saving appliances.

Edison Swan London Branches.

As from June 30th the London business of the EDISON SWAN ELECTRIC CO., LTD., will be carried on at the following addresses:—London sales office, showrooms and trade counter, 155, Charing Cross Road, W.C.2 ('Phone: Gerrard 5901); City trade counter, 228/9, Upper Thames Street, E.C.4 ('phone: City 9881); lamp trade counter, 1a, Newman Street, Oxford Street, W.1 ('phone: Museum 9801); trade counter, 71, Victoria Street, S.W.1 ('phone: Victoria 6407); radio department offices and trade counter, "Thor" department, and refrigeration department, 1a, Newman Street, Oxford Street, W.1 ('phone: Museum 9801); showrooms, Crown House, Aldwych, W.C.2 ('phone: Temple Bar 8040); also 1a, Newman Street, Oxford Street, W.1 ('phone: Museum 9801).

Scottish National Radio Exhibition.

The first Scottish National Radio Exhibition is to be held in the Waverley Market, Edinburgh, in November. Mr. T. Percy Bentley, 7, Waverley Terrace, Edinburgh, is the organiser.

New Indian Companies.

Among the companies recently formed in India are the Lower Ganges Jumna Electricity Distribution Co., Allahabad, United Provinces, capital 10,00,000 rupees, and the Sialkot Electricity Supply Co., Lahore, Punjab, capital 5,00,000 rupees.

Australian Duty Increase Postponed.

The increase from 25 to 60 per cent. in the general duty on electric household dish-washing machines imported into Australia has been postponed until October 1st next.

Dundee and Foreign Cables.

The Dundee Corporation Electricity Committee at a recent meeting discussed the question as to whether home or foreign cables should be accepted. Various supplies of cable were required and the total of the foreign offers was £5,621. The cheapest British total offer was £6,525. Convener Dunn said he regretted to have to recommend once again that the Committee purchase foreign cables—Dutch and German—as the difference in price was so much, the average being 16 per cent., or £904. Eventually the Committee effected a compromise by accepting three British tenders where the prices were not greatly in advance of the foreign, and the remaining contracts were placed abroad.

International Radio Exhibition at Bucharest.

The *Board of Trade Journal* reports that the second radio exhibition will be held in Bucharest from September 7th to 28th. This exhibition is to include the products of all the branches of the radiophonic and "aerochemical" industries, but special prominence will be given to apparatus intended for military purposes. Inquiries should be addressed to the Comité d'Organisation, Exposition Internationale de Radio, Palais des Postes, Direction Radio, Bucharest.

" Ex-Verity " Association.

It has been decided to form an Association of " Ex-Verity " men and Mr. H. J. Grant, of 62, Great Russell Street, W.C.1, is acting as hon. secretary of the movement. He will be glad to hear from " Ex-Verity " men in all parts of the world with a view to giving them details of the objects of the Association.

E.D.A. July Programme.

The July programme of the British Electrical Development Association contains a preliminary announcement in connection with the E.D.A.-E.L.M.A. Shop and Display Lighting Campaign which commences in September next. The suggested window displays for July make a special feature of water heating and wash-boilers. The water heating display shows that it is possible to arrange ungainly units, such as tanks and heating equipment to form an attractive window,

The E.D.A. Water-heating Display for July.

and the scheme is elaborated by the inclusion of electric kettles, saucepans, &c. The wash-boiler window is simple and striking in its appeal, suggesting to the housewife the means for dispensing with the drudgery of out-of-date washing methods. In both cases " Eda," the Electrical Girl, adds a finishing touch to the displays. Posters prepared for the month cover water heating, refrigeration and fans. The programme also contains a brief description of the " Eda " demonstation house at Cranleigh Gardens, Stoke Bishop, Bristol, and notes by the director on the Shop and Display Lighting Campaign. The accompanying illustration shows the water heating window display.

A Corrected Advertisement.

In our last issue Messrs. Richard Johnson, Clapham and Morris, Ltd., advertised a number of electrical appliances. The prices given were incorrect but a corrected announcement appears in this issue.

Glassware Display Extended.

Owing to the great success of the electrical glassware display arranged simultaneously at their showrooms at Manchester and London, from June 16th to 30th, Messrs. Rd. Johnson, Clapham & Morris, Ltd., have extended the period of the display for a further two weeks.

Recent Contracts.

Important orders recently received by the HART ACCUMULATOR CO., LTD., include three 60-cell batteries having ampere-hour capacities of 796, 735 and 823 respectively, to be installed in the Morningside, Murrayfield and Newington Exchanges, Edinburgh.

The BRITISH REMA MANUFACTURING CO., LTD., Halifax, is building for the Brimsdown power station of the North Metropolitan Power Station Co., Ltd., one of its patented ring roll type pulverising mills fitted with the vacuum system of classification. It is claimed that the plant will be the largest of its type in this country; will have a guaranteed output of 12 tons per hour of coal to a fineness of 80 per cent. through a 200 by 200 mesh sieve; and will handle coal having a moisture content up to 18 per cent.

Holophane Conference.

With further reference to the International Holophane Conference which is to take place on July 7th and 8th, and which will be attended by visitors from 24 different countries, we learn from Messrs. Holophane, Ltd., that the speakers will include: Dr. J. W. T. Walsh, President of the Illuminating Engineering Society; Professor Dr. J. Teichmuller, Director of the Lichttechnisches Institut, Karlsruhe; Mr. Gray Wornum, President of the Architectural Association; Mr. Howard Robertson, F.R.I.B.A.; and Mr. J. S. Dow, Hon. Secretary of the Illuminating Engineering Society.

Hack-Saw Blade Measurements.

On May 1st members of the British, American and German Hacksaw Makers' Associations put into force agreed world list prices. On the introduction of the new list the British manufacturers decided that for uniformity, the nominal inch lengths of all listed sizes should be the actual distance between outside edges of holes. This arrangement was made in order that their blades, which are made to inch measurements, should coincide as closely as possible with the corresponding blades made to millimetre dimensions. The makers of the "Eclipse" hack-saw blades, Messrs. James Neill & Company (Sheffield), Ltd., point out that this arrangement does not make any material alteration in the lengths of hand and light power blades, but involves a slight reduction in the length of heavy power blades, which, however, does not present any difficulty in tensioning up in most hack-saw machines on the market. If any difficulty should be experienced it is only necessary for the positioning holes in the tail pieces of the frame of the machine to be slightly slotted with the aid of a file.

" How to Save Money on Shopping."

A copy of a circular bearing this heading issued by the British Charities Association has lately come into our hands, and is one that should receive the attention of the trade associations. The circular states that the Association is a company limited by guarantee which under its constitution can distribute its profits only to hospitals and other charities. It goes on to state that it runs a Shopping Bureau which is able to arrange favourable terms with wholesale houses. " The advantages obtained under these arrangements are shared with purchasers using the Shopping Bureau. For all articles without a fixed retail price, including electric household appliances, vacuum cleaners and electro-medical apparatus, buyers are introduced direct to the manufacturers or wholesale distributors where they will find a very large range of choice and can select their own goods which will be delivered to them at prices below the ordinary retail price."

Hire-Purchase Scheme at Heckmondwike.

The Corporation Electricity Committee has approved a recommendation of the Working Sub-Committee that a hire-purchase scheme be adopted for the sale of electric cooking appliances, under which a consumer can purchase equipment, including an electric kettle, at cost price by making an initial payment of £1, and paying the balance in quarterly instalments spread over five years. Mains, switches, fuses and wiring (up to 30 ft. in length) are to be supplied and fitted at the Council's expense. Repairs and renewals, necessitated by ordinary use and wear will be carried out free of cost to the consumer during the period of hire-purchase.

The " I.T.T." in Shanghai and Rumania.

At a special meeting last week the shareholders of the Shanghai Mutual Telephone Co. agreed to sell their undertaking to the International Telephone & Telegraph Corporation. The company operates in the International and French Settlements of Shanghai and serves about 36,000 subscribers.

The Times reported on June 30th that a contract between the Rumanian Ministries of Public Works and Finance and the International Telephone & Telegraph Co. had been confirmed. The contract gives the company a monopoly of the Rumanian public telephone system for which it is to pay about £980,000. In addition the company is to arrange loans totalling £1,646,000 for the Rumanian Government. The State reserves the right to repurchase the system after 20 years.

Social Events.

The staff of Messrs. R. ALGER & SONS, LTD., recently celebrated their annual outing by a visit to Stonehenge and Salisbury. An early start was made from Newport station, and on arriving at Bristol three motor coaches conveyed the party through the fine country surrounding Keynsham, Bath, Monckton Combe, &c., until they arrived at Warminster, where a halt was made for lunch. From there they proceeded to Salisbury Plain and Stonehenge. Leaving Stonehenge, they

travelled on to Salisbury, and after dining at the Cadena Cafe, the opportunity was taken of visiting places of interest in that historic city. The return journey to Bristol was made *via* Westbury, Trowbridge and Bradford-on-Avon.

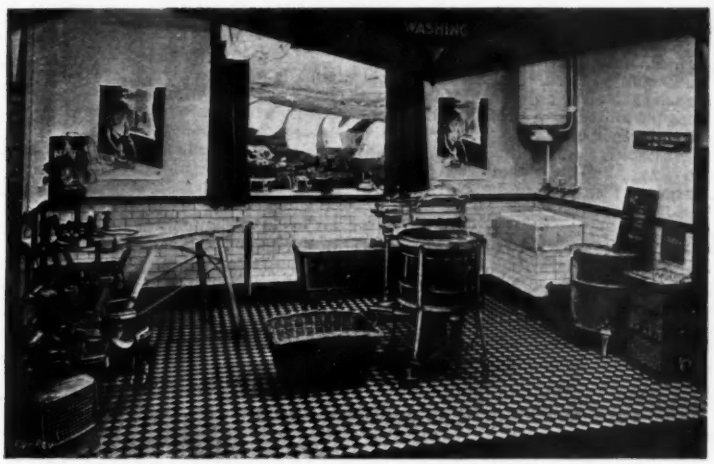
The staff and employés of MACDONALD, SYER & Co., LTD., held their annual outing on June 28th at Margate. They journeyed down by char-a-banc and had luncheon at the Fort Paragon Hotel.

Members of the Tunbridge Wells Electricity Department held their annual outing on June 25th, when Margate was visited. Luncheon was served at the West End Hotel, and was presided over by the borough electrical engineer, Mr. R. N. Torpy. On the return journey a halt was made at Goudhurst, where a smoking concert was held, the chair being taken by the chief assistant engineer, Mr. J. E. Pownall.

Bath Corporation's Electrical Exhibit.

At the recent Exhibition of Industries held in Bath, the Corporation Electricity Department's exhibit aroused considerable interest. The stands were designed to show to the public the many domestic uses of electricity, and were divided into four sections, *viz.*, washing, cooking, heating, and lighting. The running charge for electricity on the domestic tariff in Bath is ½d. per kWh, so that the consumer can employ any of the various domestic appliances shown by the department with economy.

The first portion of the stand dealt with electric washing and ironing, and demonstrations were continuously run on the "Beatty" washer, which the department supplies in its hire-purchase scheme. Various makes of electric irons were available for sale, and a demonstration of ironing was carried out continuously. The department's scheme of water heaters on hire was also illustrated by the installation of a 16½-gallon "Sadia" heater for the hot water supply for this exhibit. The second portion of the stand dealt with electric cooking and refrigeration, and demonstrations on the range of "Magnet" cookers which the department hires out were continually in progress. Much good work was carried out here by the personal contact with the housewife, and considerable business in cooker-hire was transacted. The third portion of the stand was confined to electric heating, and took the form of an oak panelled room artistically lighted by modern panel fittings and brackets. A very wide range of fires was available for sale from the inexpensive bowl fire to the period fire of Berry's Electric (1928), Ltd. The fourth portion of the stand dealt with lighting and accessories, the modern fitting productions being well represented. Artistic shades of all descriptions and prices were available for sale, and various lighting effects were demonstrated. The stand was under the management of the Sales Department, and valuable assistance was received from the local registered electrical contractors, who were in attendance daily. The cooking and washing sections are shown in the accompanying illustrations.



An Electric Washing Display at Bath.

The Bath Electricity Department's Cooking Display.

Engineering Companies' "Rationalisation" Scheme.

It was announced this week that an agreement to secure co-operative working had been concluded between Messrs. R. A. Lister & Co., Ltd., and Ruston & Hornsby, Ltd. This agreement is not of a financial character but has been arranged solely to secure efficient co-ordination in the design, manufacture and sale of the two companies' products. Under the terms of the agreement Messrs. Lister will concentrate upon the production of engines up to 25 h.p. and Ruston & Hornsby will continue to manufacture oil and gas engines. A new type of high-speed cold-starting oil engine, in sizes from 25 to 100 h.p., will be produced jointly. Close co-operation is to be secured by the appointment of the managing director of each company to the board of the other company. The managing director of Messrs. Lister & Co. is Mr. Percy Lister, while Mr. G. R. Sharpley acts in a similar capacity for Messrs. Ruston and Hornsby. At the annual meeting of the latter company this week it was stated that the arrangement would involve the closing of the company's Stockport works.

Standardisation of Wiring Accessories.

As a result of joint research by, and the interchange of experience between, the following companies comprising the Cable Research Committee: British Insulated Cables, Ltd.; Callender's Cable & Construction Co., Ltd.; W. T. Glover and Co., Ltd.; W. T. Henley's Telegraph Works Co., Ltd.; the Macintosh Cable Co., Ltd.; St. Helen's Cable & Rubber Co., Ltd.; and the Union Cable Co., Ltd.; each firm introduced this week a complete range of new and improved accessories which have been standardised and made available for use with all the wiring systems of the members. While the fittings have been specially designed to effect economy in time, it will not be necessary for a contractor to stock more than one type of accessory to use with any particular type of cable to enable installations to be carried out on any of the wiring systems of the firms mentioned. We propose to deal with the technical details of the accessories in a later issue.

Book Notices.

"Oxy-Acetylene Welding and Metal Cutting within the British Empire." Pp. 195. Published by the British Acetylene Association, 12, Russell Square, W.C.1. Price, 7s. 6d. The book constitutes a report on recent progress of the oxy-acetylene industry in Great Britain and the British Dominions which is to be presented by the British Acetylene Association at the International Acetylene Congress to be held at Zurich, July 9th to 12th (inclusive), 1930.

"New Developments in the Application of Electrical Machinery to Ship Propulsion."—A paper by E. M. Johnson, M.Sc., and G. W. Higgs-Walker, B.A., read before the Liverpool Engineering Society and an excerpt from the *Transactions* of the Liverpool Engineering Society. Vol. LI, by permission of the Council. Published by the Metropolitan-Vickers Electrical Co., Ltd., who will be pleased to send a copy to interested readers.

"The Engineering Index, 1929." 2 Vol., Pp. 2,000. Published by the American Society of Mechanical Engineers, 29, West 39th Street, New York, N.Y. Price, $50. The new edition of this work contains about 50,000 references to technical papers, reports, articles, &c., published last year in 1,800 engineering and trade magazines, Government bulletins and research reports.

"Trade Mark Law and Practice," by A. W. Griffiths, B.Sc. (Eng.) Lond. Pp. xvi+252. London: Sir I. Pitman & Sons, Ltd. Price 10s. 6d. net.

"Electrochemical Interactions of Tungsten, Thorium, Calcium, and Oxygen." London: Humphrey Milford. Price

2s. 6d. This publication is a copy of the Chandler Lecture for 1929, which was delivered by Mr. Irving Langmuir, General Electric Co. of America, at Columbia University.

Bankruptcy Proceedings.

J. W. HUNT, 220, Wells Road, Bristol, electrical engineer.—The first meeting of creditors was held on June 25th at Bristol. The statement of affairs disclosed liabilities of £2,138 and assets of £48, leaving a deficiency of £2,090. The debtor attributed his failure to want of capital, bad trading, ill-health and pressure by creditors. The case was left in the hands of the Official Receiver, as trustee, who remarked that he did not think that the creditors could hope for a dividend.

E. F. LEE, electrical engineer, &c., 340a, King's Road, and 34, Beaufort Street, Chelsea.—An application was made to Mr. Registrar Mellor at the London Bankruptcy Court, on June 20th, for an order of discharge on behalf of this bankrupt who failed in February, 1929, with provable debts of £328 and assets which had realised £19. The failure was attributed to bad trade, bad debts and heavy overhead expenses. The discharge was suspended for one month.

N. A. WILEMAN, trading as A. Wileman & Co., 141, Commercial Street, Maesteg, Glam., electrical engineer and contractor.—The public examination of this debtor was held on June 19th at the Court House, Wyndham Street, Bridgend. According to the statement of affairs there was a deficiency of £557. The debtor attributed his failure to underestimating in contracts through lack of experience. The examination was adjourned.

J. TUCKER, 30, Lower Ashley Road, Bristol, trading as the Bristol Radiator Co., wireless dealer.—A statement of affairs presented at a recent meeting of creditors showed gross liabilities of £344, of which £327 was expected to rank, against assets of £29. The debtor attributed his failure to illness, lack of capital, and bad trade. The case being a summary one was left in the hands of the Official Receiver as trustee.

H. TURNER, 20, Battersea Rise, Clapham Common, S.W., radio and electrical contractor.—The receiving order herein was made on June 11th, on debtor's own petition. The statement of affairs shows liabilities of £702 and net assets of £125, leaving a deficiency of £577. The debtor attributes his failure to falling off of trade and insufficient profits to meet overhead charges.

T. S. HANSON, electrical contractor, 26, Nether Hall Road, Doncaster.—The first meeting in this matter was held on June 25th at the Official Receiver's offices, Figtree Lane, Sheffield. According to the statement of affairs filed there were liabilities of £1,572 and a deficiency of £758. Mr. T. A. Stoker, 71, Albion Street, Leeds, was appointed trustee.

J. H. NOBLE, electrical engineer and contractor, 12, Highbridge, Newcastle-upon-Tyne.—Receiving order made June 23rd, on debtor's petition. First meeting, July 4th, at the Official Receiver's office, 81, St. Mary's Place, Newcastle-upon-Tyne. Public examination, July 23rd, at the Court House, 56, Westgate Road, Newcastle-upon-Tyne.

E. E. HARRISON, electrician, 27, School Lane, Heaton Chapel.—Trustee, Mr. J. D. Turner, Byrom Street, Manchester, Official Receiver, released June 10th.

J. L. WHITING, electrical engineer and contractor, 4, Portland Street, Newark.—Trustee, Mr. L. A. West, Official Receiver, released June 5th.

L. J. COLLER, electrical engineer, 63, Henton Road, Leicester.—First and final dividend of 6s. 5½d. in the £, payable July 9th, at the Official Receiver's office, 1, Berridge Street, Leicester.

N. JARVEIT, electric lamp dealer, 58, Bedford Street, E.1.—Trustee, Mr. E. Parke, Bankruptcy Buildings, Carey Street, W.C.2, Official Receiver, released May 28th.

T. H. DENNIS, electrician, decorator, &c., 176, 178, and 195, Denman Street, Nottingham.—Trustee, Mr. D. C. N. Duncan, 8, St. Peter's Churchwalk, Nottingham, appointed June 19th.

F. C. SPRAGUE, electrician, 44, Victoria Avenue, Mumbles, Swansea.—Trustee, Mr. H. Rees, Government Buildings, St. Mary's Street, Swansea, Official Receiver, released June 2nd.

Company Liquidations.

C. F. YOUNG, LTD., electrical and wireless factors, 13, Upper Charles Street, Leicester.—A meeting of the creditors was held on June 25th at the Leicestershire Trade Protection Society's offices, 4, New Street, Leicester. Prior to the liquidation the shareholders had passed a resolution nominating Mr. T. F. Birch, C.A., of Messrs. A. C. Palmer & Co., Friar Lane, Leicester, to be the liquidator of the company. The liquidator submitted a statement of affairs which disclosed liabilities of £3,053, of which £2,779 was due to the trade, and there were cash creditors for £274, and receiver's liabilities totalling £278. From those amounts had to be deducted the cash in the hands of the receiver totalling £220, leaving an amount of £1,080 to rank. There were net assets of £1,125, leaving a deficiency of £1,928. After discussing the position it was resolved that the nomination of Mr. Birch as liquidator should be confirmed. A committee of inspection was also appointed to act with the liquidator. The liquidator said that negotiations were in progress to sell the business as a going concern and the creditors would be notified in due course as to the result of those negotiations. The following are the principal creditors:—

	£		£
Anglin & Co.	97	Midland Electric Mfg. Co., Ltd.	138
Aspell & Barnes	75	Perfecta Seamless Steel Tube & Conduit Co.	87
F. C. Blackwell & Co. ...	74	C. H. Parson, Ltd. ...	71
Credenda Conduits Co., Ltd.	50	Pope's Electric Lamp Co., Ltd.	84
Edison Swan Electric Co., Ltd.	60	Stearn Electric Co., Ltd.	78
General Accessories Co., Ltd....	71	Tungsram Electric Lamp Works, Ltd.	90
J. Godden & Co., Ltd. ...	94	Universal Gramophone and Radio Co.	116
H. Hives	76	F. Arno Wolf	117
Johnson & Philips, Ltd.	73		
Magna Wire & Cable Co.	147		

K.N. ELECTRICAL PRODUCTS, LTD., Singer Street, Tabernacle Street, E.C.—The first meetings of the creditors and shareholders of this company were held on June 20th at Carey Street, W.C., before Mr. H. P. Naunton, Assistant Official Receiver. The winding up order was made on May 6th upon the petition of a creditor. The chairman reported that the company was registered on July 6th, 1928, as a private company with a nominal capital of £6,000, to carry on business as manufacturers of and dealers in electrical appliances; also to purchase the business carried on by Ignatius & Francis Knowles under the style of Knowles & Son, at 87, Wardour Street, W. The whole of the capital had been issued, £3,000 for cash and £3,000 allotted as fully paid to the vendors. The trading accounts showed a loss of £7,807 to March, 1930. Funds were raised by three debentures of £1,000 each, and on March 26th, 1930, Mr. J. M. Ferguson, C.A., was appointed receiver for the bondholder and carried on the business until the date of the winding up order. The business was continued in the hope of securing a large order for radio apparatus, which, however, was not obtained. A statement of affairs had been lodged showing total liabilities of £8,900 (unsecured £6,271), and assets £2,416 (absorbed by the preferential and the debenture claims), leaving a total deficiency of £12,271 to the contributories. The failure was attributed to the bad radio season of 1929-30, unprofitable trading, and insufficient capital with which to carry on until the business was stabilised. The liquidation was left in the hands of the Official Receiver.

HODGES SWITCHGEAR CO., LTD.—Winding up voluntarily. Liquidator, Mr. D. V. House, 590 and 597, Salisbury House, London Wall, E.C.2.

DAVID HART & CO., LTD.—Winding up voluntarily. Liquidator, Mr. G. E. Williamson, North London Iron Works, Wenlock Road, City Road, N.1, to whom particulars of claims should be sent by July 12th.

N.T., LTD.—Winding up voluntarily. Liquidator, Mr. W. R. Clemens.

LONGFORD INSULATING CO., LTD.—A meeting of creditors was held on June 30th at 323, Broad Street, Pendleton, Salford.

ELECTRAMONIC CO., LTD.—Particulars of claims to be sent to the liquidator, Mr. G. E. Seaman, 1, Budge Row, E.C.4, by July 14th.

SENNYBRIDGE ELECTRIC SUPPLY CO., LTD.—Winding up voluntarily. Liquidator, Mr. W. J. James, 11, Lion Strtet, Brecon.

THOMAS J. DIGBY ILLUMINATING ENGINEERING CO., LTD.—Winding up voluntarily. Liquidator, Mr. C. H. Temple, 7-8, Norfolk Street, W.C.

Private Arrangements.

C. C. ATKINSON, radio engineer, 35b, High Street, Bedford.—A meeting of creditors was held on June 24th at the offices of Messrs. Keen, Shay, Keens & Co., Ltd., New Broad Street, E.C., when a statement of affairs was presented which disclosed liabilities of £2,692, of which £905 was due to the trade. The net assets were £387, leaving a deficiency of £2,304. Mr. Keens reported that there was an excess of liabilities over assets as at September 30th, 1928, of £1,051. After leaving the army, the debtor was employed with a wireless firm in Bedford, and afterwards with the Halcyon Wireless Co., Ltd. He left them in 1925 and then commenced business on his own account in Bedford with a capital of £315. For the fifteen months ended September 30th, 1928, the turnover was £3,105. There was a gross profit of £896, and a loss of £397, whilst the drawings had been £504. In the following year the turnover was £3,689; there was a gross profit of £806, a loss of £520, and the drawings had been £240. Mr. Keens stated that the debtor attributed his position to the abnormal cost of advertising, travelling expenses, &c., the slump in trade at the commencement of 1930 which caused bankrupt stock to come into the market in competition, and also to lack of capital. Mr. Keens added that provided the creditors would agree to the estate being dealt with privately, three of the cash creditors would withdraw their claims. A resolution was passed agreeing to a deed of assignment being executed in favour of Mr. Keens as trustee. It was also understood that all suing costs incurred by creditors should be paid in full. The following are the principal creditors:—

	£		£
Bedford Electrical Radio Co.	48	Mullard Wireless Service Co., Ltd.	56
A. C. Cossor, Ltd.	30	Marconi's Wireless Telegraph Co., Ltd.	150
Graham Amplion, Ltd.	38	Ripaults, Ltd.	54
General Electric Co., Ltd.	36		

P. T. KING, 17, Manchester Street, Luton, electrical engineer.—A meeting of creditors was held recently when the representative of W. T. Henley's Telegraph Works Co., Ltd., presided. A statement of affairs was submitted which disclosed liabilities of £1,580, all due to unsecured creditors. The net assets were £4,102, leaving a surplus of assets over liabilities of £2,522. The debtor started business 26 years ago and traded successfully until 1920. In that year his capital was £9,288. From 1922 there was a loss each year, except in 1925 and 1927. The debtor had invented an electric motor and the patent had been taken over by one of the creditors who intended to manufacture the motor on a large scale, and pay the debtor a royalty of 7½ per cent. on sales, which it was estimated would give him about £700 per annum. The present position had been brought about by keen competition, shortage of working capital, and over-stocking. It was decided that the debtor should be allowed to continue trading, but that, in order to protect the assets, a deed of inspectorship should be executed in favour of Mr. W. A. J. Osborne, Balfour House, Finsbury Pavement, E.C., as trustee, with a committee of inspection consisting of Mr. E. H. Hawkins, representing creditors; Mr. E. Judd, representing Drake & Gorham Wholesale, Ltd.; and the representative of W. T. Henley's Telegraph Works Co., Ltd.

A. MUDIE, trading as the National Radio and Electrical Services, 621, Pollokshaws Road, Glasgow.—A meeting of creditors was held recently when a statement was submitted which showed liabilities of £114 and net assets of £162, leaving a surplus of £18. The debtor offered to pay 10s. in the £ in cash and the balance by two equal instalments at three and six months. The offer was provisionally accepted.

Receiver Appointed.

Mr. F. T. Smith, Premier House, 150, Southampton Row, W.C., has been appointed receiver and manager of AUTOMATIC RECTIFIERS, LTD., by the debenture holder.

New Catalogues and Lists.

WARDLE ENGINEERING CO., LTD., Elsinore Road, Old Trafford, Manchester.—Publication No. L.553, describing the company's flashing traffic beacons and public lighting units. Illustrated and priced.

Messrs. CALLENDER'S CABLE & CONSTRUCTION CO., LTD., 2, Surrey Street, Strand, W.C.2.—A pamphlet illustrating and describing a new range of straight joint-boxes for multi-core l.p. cables. Priced.

SIMPLEX CONDUITS, LTD., Garrison Lane, Birmingham.—An illustrated price list (No. 1156A) of conduits and conduit fittings.

DRAYTON REGULATOR & INSTRUMENT CO., LTD., West Drayton, Middlesex.—An illustrated leaflet dealing with automatic mixing valves.

LONDON ELECTRICAL CO., Sherborne Lane, King William Street, E.C.4.—A number of pamphlets dealing respectively with the "L.E.C." electric sealing wax heater, bakelite lampholders and adaptors, fans, and "Belling" cookers.

Messrs. WATSON & SONS (ELECTRO-MEDICAL), LTD., 43-47, Parker Street, Kingsway, W.C.2.—A well illustrated booklet describing the h.p. direct pressure test for cables and overhead lines.

GLEDHILL-BROOK TIME RECORDERS, LTD.—A leaflet drawing attention to the company's system of time recording.

Messrs. NEWTONS OF TAUNTON, 6, Grape Street, Shaftesbury Avenue, W.C.2.—A useful booklet entitled "Notes on the Charging of Batteries," dealing in a simple manner with various aspects of portable battery charging

ALTON BATTERY CO., LTD., Alton, Hants.—A well-produced brochure describing some of the many battery installations carried out by the company, with some excellent illustrations of batteries in use at power stations, telephone exchanges, &c.

LIVERPOOL ELECTRIC CABLE CO., LTD., Linacre Lane, Bootle, Liverpool.—A catalogue of the company's paper-insulated cables, containing full particulars of single- and multi-core cables for l.p. (660 V) working. The data given includes thickness of dielectric and lead sheathing, and overall diameters and weights.

Messrs. W. T. GLOVER & CO., LTD., Trafford Park, Manchester.—List No. 24, describing the company's wiring systems. Illustrated and priced.

Messrs. HOPKINSONS, LTD., Huddersfield.—List No. 2,000, containing illustrated particulars of the company's reducing and surplus valves.

BRITISH INSULATED CABLES, LTD., Prescot.—A comprehensive catalogue of the company's manufactures, covering cables for all purposes, flexibles, joint boxes and pillars, jointing materials, meters, condensers, &c. Brief particulars of the company's productions are given, together with tables of sizes, &c., of cable, and the list is fully illustrated. Reference to the various sections is facilitated by index tabs, and the publication is bound in a strong cloth cover.

SIMPLEX CONDUITS, LTD., Garrison Lane, Birmingham.—A price list of "Simplex" conduits.

Messrs. W. T. HENLEY'S TELEGRAPH WORKS CO., LTD., Holborn Viaduct, E.C.1.—Three publications (Sections B.F., B.T., and B.K.) dealing, respectively, with the company's twin wiring system, the "Bondit" wiring system, and the "Nomet" wiring system. Fully illustrated and priced.

Trade Announcements.

Owing to the need having arisen for extended arrangements for manufacturing its "Hodac" switchgear, the HODGES SWITCHGEAR CO., LTD., has decided to wind up voluntarily and the production of its apparatus has been taken over by the Power Equipment Co., Ltd., of Kingsbury Works, Hendon, N.W.9. Mr. Cecil Hodges has taken an interest in this company and joined it as sales director; all "Hodac" gear will be made under his direction at Hendon.

Messrs. DRAKE & GORHAM, LTD., have recently removed their works at Rockingham Works, Newington Causeway, S.E., to their new building at Standard Road, Park Royal Road, Acton, N.W.10.

Messrs. J. COLES & SONS, electricians, of Taunton, have removed their business from Wyndham House, Winchester Street, to Barton House, Canon Street.

The head office of LODGE-COTTRELL, LTD., has been moved to George Street (Parade), Birmingham. The telephone numbers and telegraphic address remain unchanged.

A new depôt is being opened by the TUNGSRAM ELECTRIC LAMP WORKS (GREAT BRITAIN), LTD., at 101, High Street, Southampton, on July 7th, for the sale of "Tungsram" lamps and "Tungsram" barium radio valves. This depôt will serve the whole of the Hampshire, Dorset, and Salisbury area. (Telephone: Southampton 6108.)

Messrs. H. A. MCQUEEN & CO., LTD., have removed to new offices and showrooms at 152-154, St. Vincent Lane, Glasgow. (Telephone: Central 7791.)

Messrs. CHESTERTON, JONES & CO., Birmingham, manufacturers of "Davidson" domestic appliances, have appointed Mr. H. A. McQueen, 152/154, St. Vincent Lane, Glasgow, as their representative for Scotland. A showroom has been opened at this address and large stocks are available.

Messrs. BROWETT, LINDLEY & CO., LTD., Patricroft, Manchester, have purchased the whole of the patterns, drawings, goodwill and trade name of Messrs. Bumsted & Chandler, Ltd., Hednesford, Staffs.

Canadian General Electric Co., Ltd.

Particulars of the Canadian General Electric Co., Ltd., were filed on June 14th, 1930, pursuant to Section 344 of the Companies Act, 1929. The capital was originally $1,000,000, but was increased by various stages to $20,000,000 in 1921. $2,000,000 of this was preference stock. In December, 1923, the preference stock was redeemed and cancelled. The capital is now $18,000,000 in 188,845 common and 171,155 preference shares of $50 each, all issued and paid up. The company was incorporated on July 15th, 1892. The head office is at 212, King Street, W., Toronto. The British address is 2, Lombard Street, E.C.3, where Oswald Brough, Supervisor of the Securities Department, is authorised to accept service of process and notices on behalf of the company. The directors are: J. J. Ashworth, G. W. Beardmore, J. H. Black, H. C. Cox, D. C. Durland, A. E. Dyment, S. Haas, Sir Herbert Holt, W. L. Matthews, E. G. Patterson, J. A. Richardson, His Hon. W. D. Ross, J. C. Smith and A. M. Stewart, K.C. The two principal subsidiaries of the company are the Canadian Allis Chalmers, Ltd., and the Architectural Bronze and Iron Works.

For Sale.

North Riding Mental Hospital has for sale generating plant, &c.

(See our advertisement pages to-day.)

New Municipal Showrooms at Maidstone.

New showrooms for the Maidstone Corporation Electricity Department were inaugurated on June 24th by the Mayor.

Unemployment.

There was an increase of 110,193 in the number of registered unemployed during the week ended June 16th, at which date the total was 1,885,300, as compared with 1,775,107 on June 2nd, and 1,122,713 on June 17th, 1929.

Prices of Materials.

Messrs. Edward Till & Co. report, July 1st: India-rubber, Para fine, 7½d., ¼d. decrease.

Messrs. James & Shakespeare report, July 1st: Copper bars (best selected), sheet and rod, no change. English pig lead, £19 5s., 5s. decrease.

In their letter dated June 27th, Messrs. James Forster and Co. stated that the lead market was moderately active last week, and apart from the re-appearance of the backwardation owing to the belated covering and hedging sales, no fresh feature has arisen. Producing interests have again been supporting the market, and but for this the price level would have been lower. While it is asserted that the position of lead, so far as this country is concerned, is quite sound, with stocks of moderate proportions, in the United States stocks have increased.

Lighting and Power Notes.

Abergavenny.—ELECTRICITY SCHEME.—At a recent meeting of the Rural District Council, Mr. Legge, of the Shropshire, Worcestershire and Staffordshire Power Co., attended to seek the Council's support to an application for an order to supply the district by means of a line to pass through Pontrilas, Pandy, and Abergavenny, into Crickhowell. Mr. Legge said that the company undertook to give a supply of electricity in the borough before the end of the year if possible, and the charges in villages would be 8d. per kWh for lighting and 1½d. per kWh for heating and cooking, with 2d. or 2½d. per kWh for power, falling to 1½d. or 1¼d. At the request of the Council Mr. Legge promised to forward further particulars of the scheme.

Australia.—SYDNEY (N.S.W.).—We have received from Mr. R. Vine Hall (acting general manager of the Municipal Electricity Department) a copy of his annual report, together with the statement of accounts for the year ended December 31st last. The total revenue amounted to £2,549,685, as compared with £2,249,796 in the preceding year. Working expenditure decreased from £1,376,620 to £1,241,241, leaving a gross profit of £1,308,444 (£873,176). After providing for depreciation, interest, sinking fund, and other charges totalling £1,117,096, the net profit was £191,348, as compared with a loss of £33,737 for 1928. This was disposed of as follows:—Renewals reserve, £45,000; writing off accumulated deficit. £94,212; consumers' deposits accrued interest reserve, £10,246; and general reserve, £41,890. The capital expenditure during the year amounted to £2,440,550, and included £1,052,801 for lands, buildings, machinery, and apparatus at Bunnerong station, £348,912 for sub-station plant, and £721,785 for underground and overhead mains. The total spent on the undertaking now stands at £15,826,780. The electrical energy generated totalled 360,848,400 kWh, of which 238,249,000 was generated at the Bunnerong station. The quantity purchased from the Government Railways and Tramways Department was 66,435,900 kWh. The Electricity Department ceased to take a supply from this source in September last. The sales of electricity increased from 300,984,176 to 347,594,540 kWh. The maximum demand fell from 124,425 to 124,350 kW, and there was an improvement in load factor from 33.29 to 39.21 per cent. The average price obtained per kWh fell from 1.720d. to 1.693d. The first section of the Bunnerong station, comprising six turbo-alternators with a total capacity of 150,000 kW, was completed during the year. Overhead and underground l.p. mains laid totalled 125 miles, and 66 miles of h.p. mains were laid to replace overhead h.p. lines. The report states that the satisfactory results obtained for the year are mainly due to the low cost of generation at the Bunnerong power station, and that by using the new station to the maximum and ensuring economical operation in all branches of the Department's works, still more satisfactory results may be looked for in the coming year.

Belgian Congo.—HYDRO-ELECTRICAL DEVELOPMENT.—Good progress is being made with the construction of the hydro-electric power station which the Société Générale des Forces Hydro-electriques du Katanga is establishing at Cornet to utilise the power of the Lufira falls. The dam has been completed and the work of erecting the first turbo-generator and the transformer plant is in progress. A 120,000-V transmission line between the generating station and Panda has also been completed.

Birmingham.—YEAR'S WORKING.—At the last meeting of the City Council the Electric Supply Committee reported that the output and sales last year (380 million kWh) were a record. The number of additional consumers was the largest in the history of the undertaking. The output for the year exceeded the previous year's total by 43¼ million kWh, or an increase of 13¼ per cent. The capital raised for the undertaking was increased by £1,204,670, and with the exception of £382,214 spent on extensions to the mains and distribution system, the capital expenditure was principally connected with the building and equipment of Hams Hall station. The Committee pointed out that the Department had continued to make rapid progress The number of new consumers was 11,792, and these new supplies, coupled with extensions to existing consumers, added an equivalent of 109,342 60-watt lamps and approximately 32,000 h.p. in power connections to the supply system. The maximum demand on the system during the year was 160,500 kW, as compared with 145,200 kW last year, and the load factors in the respective periods were 30.6 per cent. and 29.6 per cent.

Bolton.—YEAR'S WORKING.—The report on the working of the Corporation electricity undertaking (engineer: Mr. H. E. Annett) for the year ended March 31st last shows a total income of £305,065, as compared with £310,333 in the preceding year. Working expenses totalled £144,545, as against £131,328, leaving a gross profit of £160,520 (£179,005). After deducting capital and other charges there was a net surplus of £39,736, as compared with £53,444 in 1928-29. The capital expenditure during the year amounted to £42,626, the chief item being £21,034 for mains. The electrical energy sold decreased from 66,121,996 to 66,021,956 kWh, and the average price obtained per kWh from 1.10d. to 1.08d. There was a decrease in the sales for tramway and power purposes of approximately 700,000 kWh, but this was partly balanced by increased sales for domestic purposes.

Bradford.—INAUGURATION OF NEW PLANT.—The Corporation is inviting Princess Mary and Lord Harewood to be present on September 18th at the starting up and naming of the 30,000-kW turbo-generator now being installed at Valley Road generating station by the English Electric Co., Ltd. It is hoped that Princess Mary will start up the generator and allow it to be named after herself. The boiler and turbo-generator constituting the e.h.p. steam plant installed at the power station will shortly be ready for the official starting up, and the Electricity Committee has agreed that the city electrical engineer (Mr. Thos. Roles) be invited to start up and name one of the sections and the chairman of the Committee to start up and name the other section.

LOAN.—Application is being made for sanction to borrow £34,560 to cover the cost of works to meet requirements of the Central Electricity Board, and to complete the scheme for the reorganisation of the e.h.p. switchgear at the Valley Road power station.

Brighton.—YEAR'S WORKING.—The report on the working of the Corporation electricity undertaking for the year ended March 31st last shows a total income of £279,984 and working expenditure of £154,062, leaving a gross profit of £125,922. The figures for the preceding year were: Income, £259,227; working expenditure, £144,318; gross profit, £114,909. After deducting capital expenditure and special expenditure charged to revenue there was a net surplus of £25,526, of which £15,000 was contributed to the borough fund in aid of the general rate. The net profit in 1928-29 was £24,498. The capital expenditure during the year amounted to £195,138, and included £137,332 for machinery and plant, and £34,961 for mains. The sales of electrical energy increased from 32,247,835 to 36,073,797 kWh, and the maximum load from 18,700 to 20,900 kW. The average price obtained per kWh fell from 1.72d. to 1.65d.

ELECTRICITY SUPPLY EXTENSIONS.—The Town Council has received sanction to a loan of £10,792 in connection with the supply of electricity to Warren Farm schools, and the provision of a ring main to Rottingdean. The Ministry of Transport has consented to the use of overhead lines for this supply.

Burnley.—YEAR'S WORKING.—The accounts of the Corporation electricity undertaking (engineer: Mr. J. E. Starkie) for the year ended March 31st last show a total income of £108,094 as compared with £101,058 in the preceding year. Working expenses totalled £66,197, as against £63,824, leaving a gross of £41,897 (£37,234). After deducting capital and other charges there was a net profit of £19,716, as compared with £15,717 in 1928-29. The capital expenditure during the year amounted to £59,754, the principal item being £20,045 for mains and services. The sales of electricity increased from 12,537,398 to 13,104,543 kWh and the maximum supply demanded from 5,440 to 6,000 kW.

Burton-upon-Trent.—YEAR'S WORKING.—The accounts of the Corporation electricity undertaking (engineer: Mr. T. Hall) for the year ended March 31st last record a total revenue of £126,294, as compared with £110,839 in the preceding year. Working expenses increased from £56,359 to £65,419, leaving a gross profit of £60,874, as against £54,530. Capital charges absorbed £59,696 and there was a net surplus of £1,432, as compared with £3,374 in 1928-29. The sales of electrical energy increased from 21,062,528 to 28,467,674 kWh, and the average price obtained per kWh fell from 1.22d. to 1.03d.

Chester.—YEAR'S WORKING.—The accounts of the city electricity undertaking (engineer: Mr. S. E. Britton) for the year ended March 31st last record a total revenue of £91,429, and working expenditure of £50,701, leaving a gross profit of £40,728. The figures for the preceding year were: Income, £85,062; working expenses, £43,424; gross profit, £41,638. After providing for capital charges there was a net profit of £12,490. The capital expenditure during the year amounted to £38,620, the bulk of which was spent on mains. The sales of electricity increased from 8,863,660 to 10,164,001 kWh, and the maximum supply demanded from 4,940 to 5,648 kW.

Chesterfield.—YEAR'S WORKING.—The accounts of the Corporation electricity undertaking (engineer: Mr. D. H. Davies) for the year ended March 31st last show a total income of £76,707, as compared with £71,295 in 1928-29. Working expenses totalled £39,986 and loan charges and depreciation, £34,205, the net profit being £2,516, as against £9,515. The total working costs per kWh sold increased from 0.66d. to 0.76d.; this increase was entirely due to higher rates consequent upon the re-assessment of the undertaking. The electrical energy sold increased from 11,485,130 to 12,561,637 kWh, and the maximum demand from 5,857 to 6,008 kW.

Chiswick.—INQUIRY RESULT.—The Minister of Transport has made the following announcement in connection with the application of the Brentford and Chiswick Urban District Council and certain consumers for a revision of the maximum prices which the Chiswick Electricity Supply Corporation, Ltd., may charge for electricity, into which an inquiry was

recently held, the Minister has made an Order reducing the maximum charge from 8d. to 5d. per kWh and reducing the minimum quarterly charges from 13s. 4d. to 6s. 3d. in each of the winter quarters and to 4s. 2d. in each of the summer quarters.

Continental.—BULGARIA.—The new hydro-electric power station which is being erected by a French syndicate on the River Watscha to supply electric power to the Philippopolis district will in the initial stage comprise two 5,000-h.p. turbo-generators working under a head of about 278 ft. and a 6,000/60,000-V transformer station.

Congleton.—ELECTRICITY SCHEME.—The Town Council has agreed to terms for a supply of electricity by the Joint Electricity Authority, and a loan of £26,000 for proceeding with the scheme has been sanctioned. It is hoped to have a supply available by November next.

Ealing.—LOANS.—The Town Council has approved a recommendation of the Electricity Supply Committee that sanction be sought to borrow £107,625 in connection with the scheme to change over the whole electricity system in the Council's area of supply from single- to 3-phase supply, and to proceed with the first stage of the scheme. The scheme provides for (1) trunk main, £36,000; (2) sub-stations, land and buildings, £10,000; (3) e.h.p. switchgear, main and sub-stations, £47,000; (4) transformers, £2,625; (5) regulators, £2,000; (6) four-wire l.p. cable system (first section), £5,000; (7) contingencies, £5,000. Sanction is also to be sought to borrow £25,000 in respect of laying of l.p. mains and service lines during the ensuing three years. The borough electrical engineer has been instructed to prepare alternative designs for a main sub-station building for erection at Copley Drive, Uxbridge Road.

Faversham.—ELECTRICITY SUPPLY.—At a recent meeting of the Town Council the town clerk reported with reference to the proposed extension of the Council's area of supply that the Kent Electric Power Co. had intimated in view of its development proposals that it was unable to agree to the Council's suggestions. It had already authorised expenditure on transmission lines which passed along the route, Ospringe-Luddenham-Preston, the district in which the Council wishes to supply, and it could not agree to any arrangement which would deprive it of part of its area of supply. It was decided to reply that the Council intended to make application to the Electricity Commissioners for an Order extending the area to the limits presented to the company.

PRICE REDUCTIONS.—It is proposed to reduce charges as follows: Lighting: from 7½d. to 6½d. per kWh; and power: from 3½d. to 3¼d. per kWh.

Federated Malay States.—PERAK RIVER SCHEME.—The *Financial News* reports that a cable from the Perak River Hydro-Electric Power Company in the Federated Malay States, states that Sir Cecil Clementi, K.C.M.G., together with numerous members of the F.M.S. Government, officially opened on June 28th the new hydro-electric power station at Chenderoh. The dam across the river is 621 ft. long, impounding water now forming a lake of 10 sq. miles, extending 15 miles up the river. In the construction of the dam, 150,000 tons of concrete and 6,000 tons of steel have been used. In the centre of the dam a gate allows the passage of 30,000 cu. ft. of water per minute, which operates turbo-alternators with a capacity of approximately 40,000 h.p.

Glasgow.—SUPPLY TO HOUSING SCHEMES.—The Town Clerk has been instructed to obtain from the Electricity Department an estimate of the cost of installing electric light in "all-gas" houses in housing schemes.

NEW MAINS.—The Electricity Committee has recommended that distributing mains be laid at a cost of £5,399.

PROGRESS DURING MAY.—Under the Corporation Electricity Department's scheme, 877 houses were wired during May, bringing the total to 23,690, and hired appliances installed numbered 44, making the total to date 20,196.

London.—ST. MARYLEBONE.—Sanction has been received by the Borough Council to a loan of £5,026 for cables and switchgear in connection with the supply of electricity to the Hampstead Borough Council. The Electricity Committee has considered the consultant's report regarding the prevention of grit emission at the power station and has recommended the installation of two grit arrestors, the demolition of brick chimneys and the erection of two steel chimneys, and the reconstruction of the turbine house roof in two sections at a total estimated cost of £20,000.

STOKE NEWINGTON.—The Borough Council Electricity Committee has recommended the laying of e.h.p. cables from Edward's Lane to Woodberry Grove, and the provision of the necessary switchgear and transformer to supply electricity in connection with the underground railway extension, at an estimated cost of £5,000.

POPLAR.—The Borough Council Electricity Committee has received sanction to loans of £10,000 for extensions to distributing mains and £4,402 for the construction of a cooling tower.

Macclesfield.—PROPOSED PURCHASE OF UNDERTAKING.—The Corporation Electricity Committee has decided to place on the agenda for consideration at the July meeting of the Council the question of the Council's exercising its powers of purchasing the undertaking of the Electricity Company of Macclesfield, Ltd.

Maidstone.—NEW MAINS.—The Town Council is to lay mains to give a supply of electricity to Aylesford at an estimated cost of £3,000.

Manchester.—PROGRESS DURING APRIL.—During the month of April the Corporation electricity undertaking showed an increase of 2,366 kW in connections, bringing the total up to 426,979 kW. Applications received for supply (including additional supplies) totalled 1,113, and represented a total of 3,038 kW. The number of hired cookers connected increased by 89, making a total of 6,203 on circuit. Applications for the hire of cookers numbered 151. A new sub-station was put into commission at Odhams' Press, Ltd., and additional plant installed at Denton (West) sub-station. The change-over from d.c. to a.c. had been completed in the cases of 10,496 consumers up to May 14th, while sanction had been given and work was in progress involving 892 consumers.

Newcastle-upon-Tyne.—TARIFFS.—The Minister of Transport has given his decision following the inquiry which was held at the end of last year as a result of the demand of the Northern local authorities for a revision of electricity charges. According to the *Evening World* he has decided not to make any order on the present application, but advises the companies concerned to review their tariffs if the satisfactory results of last year's working are maintained.

Nelson.—YEAR'S WORKING.—A net profit of £7,387 is recorded by Nelson Corporation Electricity Department on the past year's working. The electrical energy sold totalled 10,515,158 kWh, as against 1,521,199 in 1922.

New Zealand.—ARAPUNI SCHEME.—Owing, it is declared, to the failure of the Arapuni hydro-electric station in Auckland Province, due to a geological fault, says the *Evening News*, the N.Z. Government is to replace it by erecting a 15,000-kW steam-operated plant in the Huntly coalfield at a cost of £200,000. It is understood that machinery now on offer in England and ready for immediate delivery is to be bought for the new station.

The Government has cabled to the New Zealand Trade Commissioner in Canada asking him to secure the services of an outstanding Canadian engineer to report on the repairs necessary to the Arapuni power plant.—*Reuter* (Wellington).

Northern Ireland.—BELFAST.—At a recent meeting of the Electricity Committee a gross profit of £220,877 and a net profit of £64,433 on the electricity undertaking for the year ended March 31st last were reported. It was stated that the flat rate for electricity would remain unaltered, but other consumers would receive reductions to the amount of about £10,000. The total output of energy increased by 15.3 per cent., and the demand for domestic supplies increased by 26 per cent.

Plymouth.—LOAN SANCTIONED.—The Corporation Electricity Committee has received sanction to the borrowing of £20,000 for the provision of additional boiler plant and switchgear.

Portland.—INAUGURATION OF SUPPLY.—An electricity supply is to be inaugurated on July 1st. Up to date the expenditure has been £16,000.

Shipley.—YEAR'S WORKING.—It was reported to the Urban District Council on June 24th that the electricity undertaking during the past year had made a gross profit of £10,200, and a net profit of £555 after meeting loan charges.

Special Orders.—Application has been made to the Electricity Commissioners for Special Orders by the Weald Electricity Supply Co., Ltd., authorisng it to supply electricity in the parishes of Forest Row and West Hoathly, and the Shropshire, Worcestershire and Staffordshire Electric Power Co. to supply in the borough of Abergavenny, and part of the rural district of Abergavenny. The Commissioners have submitted to the Minister of Transport for confirmation Special Orders made by them authorising the South Wales Electrical Power Distribution Co. to supply electricity in the parish of Llanfrechfa; Carlisle Corporation to supply in the rural districts of Brampton and Longtown and part of the rural district of Carlisle; and the Derbyshire and Nottinghamshire Electric Power Co., to supply in parts of the rural districts of Ashbourne and Sudbury.

Thornton Cleveleys.—LOAN.—Application is being made by the local Council for sanction to borrow £5,000 for electric mains and services for a period of three years.

Weymouth.—LOAN SANCTIONED.—The Corporation has received sanction to a loan of £5,787 for works required in connection with the supply of electricity to Preston and Osmington.

Wimbledon.—NEW SUB-STATION EQUIPMENT.—The Corporation Electricity Committee has received sanction to a loan of £14,605 for sub-station equipment and kiosks.

Tramway and Railway Notes.

Australia.—MELBOURNE.—According to *Electrical Engineer of Australia and New Zealand* the Victorian Railways Department is introducing petrol-electric rail cars for operating a portion of the passenger services between Melbourne and Geelong, over a distance of 45 miles. The cars are of a type that has already been in successful operation in Victoria for the last two years. They are 58 ft. in length, weigh 43 tons, carry 55 passengers, and are capable of drawing one or two trailers, each carrying 80 passengers. The power is derived from a 220-h.p. petrol engine driving a d.c. generator. The generator supplies energy to two 140-h.p. motors geared to two of the axles. With these cars it is anticipated that the operating costs will be only about 70 per cent. of those for the steam trains on the route.

Belgium.—ELECTRIC MOTOR-'BUSES.—A fleet of four battery-driven motor-'buses has recently been completed by the Société des Automobiles Miesse, of Buysinghen, Brussels, for service in connection with the International Exhibition at present being held in Liége, to convey passengers between the two sections of the display on the northern and southern sides of the River Meuse. The vehicles, which are of the single-deck type with accommodation for a total of 80 sitting and standing passengers each, are of an entirely new design, the idea of the Miesse Co. being to produce a chassis that can be used either as (1) a battery-driven vehicle (2) a trolley 'bus, or (3) an ordinary petrol-engined machine. Another feature of the new chassis is that, in order to render a maximum amount of the chassis area available for passenger-carrying purposes, the batteries are underslung between the front and rear axles in such a way that they can readily be drawn out at the sides for replacement purposes. Each of the twin rear wheels is driven by its own electric motor mounted below the body at the extreme rear of the vehicle.

Birmingham.—YEAR'S WORKING.—The accounts for the year ended March 31st last record a balance of approximately £271,000, an increase in the gross profit of nearly £37,000.

Continental.—RUSSIA.—It is stated that the National Railways Commissariat is preparing the conditions for the delivery of electric locomotives for the electrification of the Suramsk summit of the Transcaucasian railway and the Lunevsky line of the Perm railways. The first locomotives will be constructed abroad, while the others are intended to be built in Russia. These electric locomotives will be the first to be introduced on the Soviet railways.

Halifax.—SUCCESS OF CHEAP FARES.—The Corporation Tramways Department has found an experimental system of cheap fares, between 10 and 12 in the mornings and 2 and 4.30 in the afternoons, so successful financially that the trial of the system has been extended to the end of September.

Irish Free State.—DUBLIN.—TRAM AND "ZOO" TICKETS.—According to the *Electric Railway, Bus and Tram Journal*, a new departure of combined tramcar travelling and admission to the Zoological Gardens on the Dublin United Tramways system will be introduced shortly. The company has made arrangements for the issue, at an early date, of combined return transfer tickets from any part of the system to Phœnix Park, including admission to the Zoological Gardens. These tickets will be issued by conductors to passengers on all tramway cars, and special arrangements will be made for large parties.

London.—ACCIDENT.—Lieut.-Col. E. P. Anderson has reported to the Ministry of Transport on the result of his inquiry into the collision which took place at Ponders End, Middlesex, in December, 1929, between a "Metropolitan" electric tramcar and a "National" omnibus in which a number of passengers were injured, four fatally. He finds that the derailment and overturning of the tramcar were due to the shock of the omnibus striking it. The driver of the 'bus was charged with negligent driving, but the case was dismissed.

Nottingham.—TRAMCAR IMPROVEMENTS.—The Corporation is to reconstruct the interiors of 47 of its tramcars by the substitution of upholstered seats on the lower deck and rubber floor covering. The whole of the work is to be undertaken by the Transport Department and it is expected that the first of these cars will be ready in a few days.

Southern Railway.—ELECTRIFICATION PROGRESS.—According to *The Times* the electrification of three more sections of the Southern Railway has been completed, and the new services will operate on and from Sunday, July 6th. The new extensions are: Hounslow and Whitton Junction to Windsor; Dartford to Gravesend; and Wimbledon to West Croydon. The three extensions cover about 50 miles in all, bringing the length of the Southern Railway's electrified system to a total of 800 miles. The approximate cost of the extensions was £600,000. It has been necessary to build new stations, to reconstruct others, and to lengthen platforms.

United States.—NEW YORK.—A fire which occurred at Woodside, New York, wrecked 60 tramcars. The damage is estimated at £100,000.

Telegraph and Telephone Notes.

France.—RADIO-TELEPHONY.—A wireless telephone service between Paris and Rabat (Morocco) was opened on June 27th. It is hoped to extend the service to Algeria and Tunis at a later date. The Rabat-Paris link is welcomed as a definite step in the direction of better communication with the North African Colonies.—*Reuter* (Paris).

New Zealand.—TELEPHONY SALESMANSHIP.—Sir Joseph Ward, Prime Minister and Minister of Posts and Telegraphs, states that he is to establish a commercial branch of the Post and Telegraph Department. Active salesmanship is to take the place of waiting for orders in the State's telephone service. New Zealand has now a density of 10.2 telephones per 100 inhabitants as against 3.8 telephones per 100 in this country.

Rumania.—TELEPHONE CONCESSION.—At its sitting on June 27th the Chamber passed by 179 votes to 10 a Bill regarding the granting of a concession for the telephone system to an American company.—*Reuter* (Bucharest).

Siam.—WIRELESS COMMUNICATION.—As the telegraph lines down the Peninsula are subject to considerable interruption, the Chambers of Commerce of both Siam and British Malaya are trying to get wireless communication established between Bangkok and Singapore, or Bangkok and Penang. The scheme has the strong support of the Siamese Government, but so far the Straits Settlements Government has not seen its way to agree to take the necessary steps. The proposal remains under consideration; however, it is announced that whenever there is an interruption of the land lines of more than one hour, urgent telegrams (costing three times the rate for ordinary messages, will be sent by wireless.—*Reuter* (Bangkok).

Telephony.—STATISTICS.—No British town appears in the first twenty-five in the latest table of statistics of telephone development of the world's largest cities. The first six cities are San Francisco with 336 telephones per 1,000 of population, Stockholm with 298, Washington 293, Chicago 290, Seattle 286, and Toronto 275. Five American cities follow, including New York with 270; then comes Montreal with 189, and Copenhagen and Zurich are not far behind. Paris ranks nineteenth with 117, and Berlin follows with 114; eleven European cities appear in the first 25. London is twenty-sixth, with 83 telephones per 1,000. Of the United Kingdom's representatives, Edinburgh with 60 telephones per 1,000 is second best; Manchester follows with 54; Bradford has 53, Nottingham and Liverpool 47 each, Glasgow 46, Hull 45, Birmingham 43, Leeds 41, Newcastle 37, Sheffield 35, Belfast 34, and Stoke-on-Trent 21.

Radio Notes.

Czecho-Slovakia.—NEW STATION.—The Ministry of Posts and Telegraphs, in whose province the control of broadcasting lies, is erecting in Prague a building which will be the headquarters of broadcasting in that country. The new national broadcasting station which is being constructed near Cesky Brod, east of Prague, will be of 60/120 kW. At the outset communication with the Prague studios will be by wireless link, but later an underground cable will effect the connection. Test transmissions will take place early next year.

RECEIVING SET STATISTICS.—Of the 6,467 listeners who replied to a questionnaire, according to *World-Radio*, 1,404 are satisfied with the simple crystal set. The most popular appears to be the three-valve set, which is favoured by 1,742 listeners. Next come four-valve sets, owned by 1,616 listeners, and two-valve sets, the possessors of which total 888. Only twenty-two listeners have seven-valve sets, and nineteen have nine-valve ones.

United States.—LICENCE CANCELLATION.—For permitting offensive language to be used at the microphone of KWBS, Portland, Oregon, the Schaeffer Radio Company has had its broadcasting licence cancelled by the U.S. Federal Radio Commission. The charge was brought against the station by the Portland "Better Business Bureau," which, says the *Wireless World*, alleged that Mr. Robert Duncan, a candidate for Congress, who had leased the station, used the words complained of when referring to his opponents. In publishing the decision the Commission states, incidentally, that KWBS had been a constant offender in straying off its allotted wavelength.

FREQUENCY CONTROL.—With the aid of piezo-electric crystals and daily checks at the Westinghouse Co.'s research department, America's pioneer station (KDKA) at Pittsburgh, Pa., has maintained its frequency of 980 kc/s during the past three years with an average daily deviation of only plus or minus 51 parts in a million. The Federal Radio Commission's limit is plus or minus 500 cycles at a million, so that the KDKA variation is ten times better than the requirement.

Contract Information.

When "Contracts Open" are advertised in our "Official Notice" pages, the date of the ELECTRICAL REVIEW containing the advertisement is given in parentheses below.

Contracts Open.

Australia.—MELBOURNE.—July 9th. City Council. Supply of totally-enclosed metal-clad switchgear. (B.X. 6401.)*
Posts and Telegraphs Department. August 19th. Telephone jacks. (B.X. 6477.)*
July 15th. V.i.r. lead-covered cable. (B.X. 6498.)*

Bedford.—July 10th. Electricity Department. Coal handling plant and extension of sidings at the power station. (June 20th.)
July 16th. Oil-cooled single- and 3-phase transformers. (See this issue.)

Carlisle.—July 11th. Electricity Committee. 11,000-V overhead transmission line, together with certain pole-mounted switchgear. (June 20th.)

Chile.—SANTIAGO.—July 29th. State Railways. Electric clocks. (B.X. 6472.)*

Cheadle and Gatley.—July 8th. Urban District Council. Electricity Department. 250-kVA oil-cooled transformer. (June 20th.)

Doncaster.—July 5th. Town Council. Overhauling and rewiring electrical installation, Mansion House and offices, and installing electric heating. Particulars from T. W. Hibbert, electricity offices, Grey Friars Road (returnable deposit of £1 1s.).

Egypt.—CAIRO.—July 26th. Ministry of the Interior. Supply and erection of a cooling tower for the electric power station at Assiout. (A.X. 9627.)*

Farnworth.—July 23rd. Urban District Council. L.p. disconnecting boxes, frames and covers and distribution pillars. (June 20th.)

Glasgow.—July 26th. Clyde Navigation Trust. One 40-ton electric travelling coaling crane and six 5-ton semi-portal electric cranes at Glasgow Harbour. Specifications from Mr. D. Fife, mechanical engineer (deposit 3 guineas). Tenders to general manager and secretary, 16, Robertson Street, Glasgow.

Grantown-on-Spey.—Town Council. July 19th. Electric lighting at three blocks of houses. Plans and specifications from H. J. Fraser, architect. Tenders to town clerk.

India.—July 16th. India Store Department. Transformers, motors and switchgear. (June 20th.)
Bombay, Baroda & Central India Railway Co. July 16th. Signalling cables. (June 27th.)

Liverpool.—July 17th. Electric Supply Department. H.p. and l.p. switchgear for sub-stations for a period of 12 months. (See this issue.)

London.—CENTRAL ELECTRICITY BOARD.—July 28th. 132-kV transmission line crossing of the River Thames for the South-East England Electricity Scheme, 1927. (June 13th.)
Foundation works for 132-V transmission line towers over the River Thames near Dagenham. (June 27th.)

Newcastle-upon-Tyne.—July 14th. Newcastle-upon-Tyne Electric Supply Co., Ltd. Complete boiler-house equipment for the Dunston power station. (June 13th.)

New Zealand.—WELLINGTON.—Public Works Department. August 12th. 11-kV metal-clad switchgear and accessories for Mangahao. (B.X. 6455.)*
August 19th. Supply and delivery of three single-phase transformers for the Penrose sub-station. (B.X. 6427.)
DUNEDIN.—August 4th. Corporation Electricity Department. Three tons of cadmium copper trolley wire and four tons of hard drawn trolley wire. (A.X. 9785.)*

Omagh.—July 20th. Urban District Council. One 28-kW and one 56-kW heavy oil engine-driven alternator, l.p. switchboard, 3-ton hand-operated overhead travelling crane, underground and overhead mains. (See this issue.)

Plymouth.—July 10th. Corporation. Two water-tube boilers with chimney, &c. (June 20th.)

South Africa.—JOHANNESBURG.—Railways and Harbours. July 28th. Twenty-eight electric lifts for the new railway building, Johannesburg. (A.X. 9623.)*
August 11th. Thirteen four-ton electrically-driven portal jib cranes for Table Bay Harbour. (B.X. 9683.)*
City Council. August 2nd. 3-phase truck-type switchboard panels. (A.X. 9811.)*
CAPE TOWN.—July 23rd. Electricity Department. Single- and 3-phase motors and starters. ((B.X. 6497.)*
DURBAN.—Railways and Harbours. One 80-ton fixed electric crane for Congella Wharf, Durban Harbour. (A.X. 9727.)
August 15th. Corporation General Stores Department. Sixteen power transformers. (A.X. 9800.)*

Sowerby Bridge.—July 7th. West Riding Education Committee. Electric lighting installation at Bolton Brow Council School. Specifications from A. Beilby, Divisional Clerk, Education Offices, Sowerby Bridge.

Sunderland.—July 7th. Electricity Department. Supply for 12 months ending September 30th, 1931, of cable, wire, meters and lamps. (June 6th.)

Uruguay. — MONTEVIDEO. — July 31st. State Electricity Works. 84 three-phase, oil-cooled transformers. (A.X. 9768.)*

Wolverhampton.—July 14th. West Midlands Joint Electricity Authority. One 10-kVA, two 1,000-kVA, and four 25-kVA transformers, 33,000-V and 11,000-V switchgear, disconnecting boxes, services, overhead and underground mains. (June 27th.)

* Further particulars can be obtained at the Department of Overseas Trade (Inquiry Room), 35, Old Queen Street, S.W.

Contracts Closed.

Basingstoke.—Town Council. Accepted :—
Wiring houses for electric light (£239).—T. M. Kingdom and Co.

Belfast.—Accepted :—
Electrical installations at new Houses of Parliament Estate, Stormont.—T. Clarke & Co., Ltd.

Bexhill.—Electricity Committee. Recommended :—
Switchgear (£476).—A. Reyrolle & Co., Ltd.
Two-feeder panels (£144).—Bertram Thomas.

Birmingham.—Tramways Committee. Accepted :—
Supply of 40 top-covered motor'-bus bodies.—English Electric Co., Ltd.
Education Committee.
Installation of electric lighting for schools.—Gordon Hughes Electrical Co., Ltd. (£418); J. H. Payne & Co. (£101); Harrison & Searle, Ltd. (£57); Thomas Glover (£513).
Child Welfare Committee.
Electric light installation at Canwell Hall.—Truman Electrical Co.
Health Committee.
Installation of automatic telephones at Little Bromwich Hospital.—Relay Automatic Telephone Co., Ltd.
Electricity Committee.
Supply of transformers for two years.—General Electric Co., Ltd.
Rotary convertors for Saltley and Handsworth sub-stations.—Electric Construction Co., Ltd.
Switchgear at sub-stations.—Harland Engineering Co., Ltd.

Glasgow.—Public Assistance Committee. Accepted :—
Supply of electrical fittings, &c., for six months.—Wm. McGeoch & Co.

Lamp Contract.—A contract for the supply of electric lamps during 12 months from July 1st has been placed by the Royal Mail Steam Packet Co. with the Edison Swan Electric Co., Ltd.

London.—H.M. OFFICE OF WORKS. Accepted :—
Supply of gasfilled and vacuum lamps during the period ending May 31st, 1931.—British Thomson-Houston Co., Ltd.

Plymouth.—Electricity Committee. Accepted :—
Voltage regulator (£229).—Metropolitan-Vickers Electrical Co., Ltd.

Salford.—Health Committee. Recommended :—
X-ray apparatus for dispensary and sanatorium (£554).—Schall & Son.
Tramways Committee. Recommended :—
Double tramway junction (£478).—Hadfields, Ltd.

Sheffield.—Electric Supply Committee. Accepted :—
Transformers.—British Electric Transformer Co., Ltd.; English Electric Co., Ltd.; Bruce Peebles & Co., Ltd.; C. A. Parsons & Co., Ltd.
Switchgear.—A. Reyrolle & Co., Ltd.
Feeder pillars.—W. T. Henley's Telegraph Works Co., Ltd.

Stoke-on-Trent.—Public Assistance Committee. Recommended :—
50-kW generating set for Turnhurst Road institution (£719).—Belliss & Morcom, Ltd.

The "Electrical Review" Service Department.

INQUIRIES must be accompanied by a stamped addressed envelope.

We shall be glad to learn the names and addresses of makers of the following devices:—

An electrically-driven grass cutter.

We have a request for the British agents (if any) of The Automatic Electrical Co. of Cincinnati.

We also have a request for the name of the British agents of the Pelton Crane Co., Detroit.

Notes.

Association of Mining Electrical Engineers.

The twenty-first annual dinner of the Association of Mining Electrical Engineers—the first having been held in 1909—took place on June 27th at the Midland Grand Hotel, St. Pancras, N.W. Members and guests numbered about 170. The president, Mr. J. W. Gibson, was in the chair, and he showed by his speech that he believed brevity to be the soul of wit. The other speakers—Sir Alfred Faulkner, C.B.E. (Under Secretary for Mines), Capt. A. C. Spinkes, M.C., and Major Ivor David (senior vice-president)—followed his excellent example. Sir Alfred Faulkner raised an important point with reference to the fear of electricity undoubtedly felt by many miners, and emphasised the necessity for apparatus to be fool-proof as well as safe.

Some interesting particulars of the Association's activities were supplied by Major David, who said that the percentage of electrical accidents was least where the membership of the Association was strongest. The certificate of the Association was recognised as an authoritative indication that the holder was a qualified mining electrical engineer. Many of their members were responsible for very large electrical installations; the Powell Duffryn Co. had an output second only to that of the Newcastle-upon-Tyne Electric Supply Co.

The dinner was followed by a dance and an excellent cabaret. The dinner formed the climax of the annual convention in London for June 24th to 28th. Other arrangements included visits to the following works: Messrs. Crompton Parkinson, Ltd., Messrs. Marconi's Wireless Telegraph Co., Ltd., Messrs. Hoffmann Manufacturing Co., Ltd., Tilmonstone Colliery Co., Ltd., Dover Harbour, Messrs. Evershed and Vignoles, Ltd., Metropolitan Cable Co., Ltd., and Messrs. Allen West & Co., Ltd.

Mines Department Order.

The Secretary for Mines announces that on May 13th, 1930, he made an Order under Section 61 of the Coal Mines Act, 1911, approving the "Cardox" carbon-dioxide cartridge for use in all mines to which that Act applies, subject to the conditions specified in the Order. The Order, which may be referred to as the Explosives in Coal Mines Order of May 13th, 1930, has been published in the series of Statutory Rules and Orders, and copies are available, price 2d. (by post 2½d.), from H. M. Stationery Office.

A Large Transformer Tank.

In the note appearing under the above heading in the ELECTRICAL REVIEW of June 13th (p. 1117) acknowledgment of the design of the tank, radiators, and gilled tubes should have been made to the Fuller Electrical and Manufacturing Co., Ltd., associated with A.S.E.A. Electric, Ltd., who are the contractors to the Central Electricity Board.

Scales of Depreciation.

The Electricity Commissioners have submitted to the Minister of Transport for confirmation three Special Orders fixing scales of depreciation in relation to (*a*) transmission lines used by certain authorised undertakers for giving bulk supplies of electricity, (*b*) the cost of production at certain selected generating stations, and (*c*) the acquisition of selected generating stations and main transmission lines. Copies of these Orders as submitted for confirmation may be obtained from the Secretary, Electricity Commission, Savoy Court, Strand, W.C.2.

Combined Natural-gas and Oil Boiler Firing.

Several years ago the Argentine Government invited tenders for the construction of a power station for the State oil fields of Commodoro Rivadavia, situated in the south of the country. The A.E.G. Co. of Germany secured the contract. The present capacity of the station is 15,000 h.p., but it is anticipated that further extensions will be necessary in the near future, inasmuch as the oil fields are developing very rapidly. The station was erected in close proximity to the Atlantic coast, about 500 yards inland. The generating plant so far installed consists of three 5,000-h.p. turbo-generator sets of the two-cylinder type, designed for a steam pressure of 325 lb. per sq. in. and a temperature of 660 deg. F. The alternators have each an output of 3,700 kW at a power factor of 0.65; they generate power at 10,400 V and 3,000 r.p.m.

The necessary steam is supplied by a battery of three inclined water-tube boilers, each having a heating surface of 6,400 sq. ft. Normally each boiler has an output of 18 tons of steam per hour at a pressure of 350 lb. per sq. in. and a temperature of 720 deg. F. A feature of the plant is the novel method of boiler firing. In oil-field areas modern steam-power stations usually employ the natural gas escaping from the wells for boiler-firing purposes, a system of oil firing being provided, however, in case of any failure of the natural-gas supply. The boilers at the Rivadavia station are provided with four single burners for natural-gas firing, which is ordinarily used, while the oil burners are positioned on top of the front wall of each boiler in two rows of five. By dividing the firing installation into several sets of single burners, it is possible to adjust the fuel supply to the boiler load by cutting in or out certain of the burners.

Educational.

NORTHAMPTON POLYTECHNIC INSTITUTE.—Full-time courses in engineering. Entrance examination, July 16th, for the Polytechnic Diploma and the Engineering Degree of London University. (See our advertisement pages to-day.)

Electricity Supply in Canada.

The Department of Trade and Commerce Dominion Bureau of Statistics, Transportation and Public Utilities Branch, has just published a preliminary report on the central electric station industry in Canada for 1928. Central electric stations in Canada produced 16,337,804,000 kWh during 1928, which was an increase over the 1927 output of 12 per cent., and an increase over the output in 1920 of 177 per cent. The capital invested was $956,919,603, or more than twice the investment in 1920, and an increase during the year of $90,094,318. This was a larger capital expenditure than Canadian railways reported for 1928, and the total investment to the end of the year was greater than for any other Canadian industry, except railways and agriculture. The rapid development of the pulp and paper industry has been an important factor in the growth of the central electric stations. In 1928 the motors in the pulp and paper mills, which were operated by power purchased from central electric stations, had a rating of 859,017 h.p., or 96 per cent. of the total rating of all such motors in manufacturing industries and mines, having increased in capacity by 520 per cent. since 1920. The total output of the central electric stations is made up of the domestic and commercial lighting loads, including street lighting, power loads, and exports to the United States, the last item amounting to 1,634,871,000 kWh, or 10 per cent. of the total output. During the year the net reduction in the number of organisations producing electric energy for sale was 97, which was effected largely through the acquisition of small installations by large organisations. The ratio of output to rated capacity of generators was 51.2 per cent. for the industry as a whole, which was the highest yet attained in any year since the census has been taken. The groups of fuel stations, mostly small local ones, showed ratios ranging from 3.8 per cent. to 30.8 per cent., whereas in the hydraulic groups the ratios ranged from 4.2 per cent. to 57.6 per cent., the latter being attained by the municipal hydraulic stations in Ontario. The net decrease in the number of power stations operated was 28, the largest increase being 9 in British Columbia, and the largest decrease being 26 in Alberta. The total revenue for the year amounted to $112,326,819, which was an increase over the 1927 revenues of $8,293,522, or 8 per cent. The number of consumers amounted to 1,464,005, as against 1,381,968 for 1927. This increase of 82,037 included 64,945 domestic lighting, 16,297 commercial lighting, and 795 power customers. The pole-line mileage of transmission lines increased by 2,081 miles, or 17 per cent., and of distribution lines by 1,679 miles, or 8 per cent. The largest provincial increase was in Ontario, with increases of 185 miles of transmission and 1,309 miles of distribution lines. The largest addition to auxiliary plant equipment was 14,775 h.p. in commercial stations in Alberta. This was affected by the Calgary Power Company (hydraulic station) leasing the fuel plant of the city of Calgary, thus switching from main plant in a fuel station to auxiliary equipment. During the year 12 large hydraulic turbines with capacities of 25,000 h.p. and over were installed, 8 in Quebec, 2 in Manitoba and 2 in British Columbia. These wheels accounted for 398,000 h.p. of the total net increase of the 470,519 h.p. for all sizes of wheels. The number of small wheels (under 500 h.p.) decreased from 220 of 40,272 h.p. to 187 of 33,126 h.p. Also, the number and total capacity of d.c. dynamos decreased from 311 of 9,728 kW to 277 of 7,295 kW.

Architectural Course for Illuminating Engineers.

Under the auspices of the School of Architecture, Columbia University, a six-day course of lectures for members of the Illuminating Engineering Society on "Fundamentals of Architecture" is to be held at Architectural League Club House, N.Y., on September 8th to 13th. The course will include visits of inspection. Application for enrolment should be made to Prof. H. Vandervoort, School of Architecture, Columbia University, New York City, N.Y.

Generation of Electricity in May.

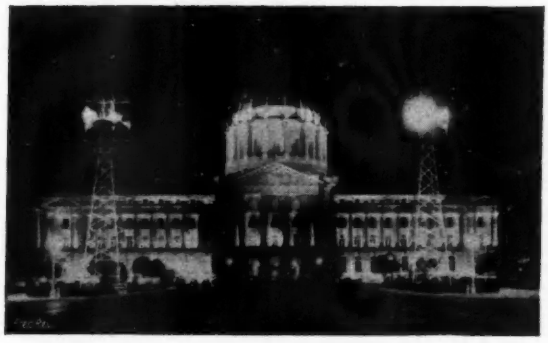
The official returns rendered to the Electricity Commissioners show that 818 million kWh were generated by authorised undertakers in Great Britain during the month of May, 1930, as compared with 753 million units in the corresponding month of 1929, an increase of 8.6 per cent.

During the five months of 1930 up to the end of May, the total amount of electricity generated by authorised undertakers was 4,672 million kWh, as compared with 4,404 million kWh for the corresponding period of 1929, representing an increase of just over 6 per cent.

The N.E.L.A. Convention.

The annual convention of the National Electric Light Association held at San Francisco a fortnight ago provided a great deal of amusement as well as instruction to the very large number of delegates attending from all over the United States.

On June 16th the San Francisco Electric Development League held a luncheon and were fortunate enough to secure as their principal speaker Mr. Wentworth Fielding, described



Illuminations at the N.E.L.A. Convention, San Francisco.

as "a member of the British Parliament and appointee of the Electricity Commission." In his remarks Mr. Fielding discoursed on the position of electricity supply in Great Britain and even said a word in favour of a variety of systems of supply which gave the consumer a wide assortment to choose from and made him reluctant to move from the district in which he had settled. He also had something to say on American water-power. Apparently the speech and the speaker were accepted in good faith, but it was divulged later that "Mr. Wentworth Fielding" was a "movie" actor from Hollywood.

That was one aspect of the lighter side of the Convention. Another is illustrated in the accompanying picture, which shows the illumination of the Civic Centre, San Francisco. Here there were four "pylons" equipped with flood- and spot-lights and a large lighthouse in addition.

The Mercury Boiler.

The mercury-vapour generating unit at the South Meadow station of the Hartford Electric Light Company is producing a net kilowatt-hour for a fuel consumption of seven-tenths of a pound in regular daily service, according to a recent announcement in the *Electrical World*. Comprehensive tests of this unit are now being analysed, and will be made public in the near future, together with an official statement from the Hartford company as to the economy and reliability of the mercury-vapour process in commercial central-station service.

The Photo-electric Cell as a Coloroscope.

A new use for the photo-electric cell for comparing colours is related in *Science*. Textiles of slightly varying shades are now classified by the photo-electric cell more expertly than can be done by the human eye. Its new application was publicly demonstrated for the first time recently before the New York Electrical Society by Dr. H. H. Sheldon and Dr. W. A. Schneider, physicists of New York University. Dr. Sheldon explained that two cells are used which create a balanced circuit and hold a deflecting needle at zero when both receive the same amount of light. But when the colour of the article under one cell is different from that of the article under the other, different amounts of light are reflected to the cells, different currents pass through them, and the needle becomes unbalanced and swings away from zero. The needle will vary even when the shades look exactly alike to the human eye. Error may be introduced by the effects of weave and sheen. Weave effect is overcome by rotation, which melts the pattern into one solid mass of colour. Sheen is counteracted by the use of a spherical photometer in which light is reflected from the cloth in all directions, so that a concentration of light at any one point is eliminated.

Diesel Engine Users' Association.

The Committee of the Association has decided to offer a prize, which will consist of a medal and 25 guineas, for the paper contributed during the year 1931 which is considered to be of the greatest value to the Diesel engine user. The award will not be restricted to members of the Association.

Fatality.

An inquest was held on June 25th on Desmond Taylor (15), electrician's mate, who received a fatal electric shock at the British Bemberg Artificial Silk Factory, Doncaster. Jack Kenneth Glover said he and Taylor were working in a duct. It was necessary to fix a temporary light, and when he had finished it he told Taylor to screw the bulb into the holder. Taylor said "It's a good light," then fell back against the wall. Witness switched off the current and called for assistance. Benjamin Higton, electrician at the works, said when he went into the duct he was informed of the accident. The floor was wet and the voltage was 230. Apparently the wrong lampholder had been used. He did not give the boys permission to fix up the light, but whilst he was absent they had done it in order to get on with their work. A verdict of "Death from shock following accidental electrocution" was returned.

Appointments Vacant.

Draughtsman and junior draughtsman for Salford Electricity Department.

Mains assistant for Darwen Electricity Department.

Assistant sales engineer for Bradford Electricity Department.

Shift engineers for the Gold Coast Government Railway.

Shift charge engineer for Darlington Electricity Department.

Deputy chief engineer for Manchester Electricity Department.

Electrical Inspectors of Factories for the Home Office.

Power stations engineer, and consumers' and rates engineer for Sheffield Corporation Electric Supply Department.

(See our advertisement pages to-day.)

Institution Notes.

Institution of Electrical Engineers.

In addition to the Council's nominations for vacancies which will occur in September next (see June 13th issue, p. 1117) the following gentlemen have been independently nominated:—*Vice-president:* Mr. E. H. Shaughnessy; *members of Council:* Messrs. J. Frith, R. Borlase Matthews, and V. Watlington.

SOUTH-MIDLAND CENTRE.—The summer meeting of the Centre took the form of a visit to the Maentwrog hydro-electric power scheme of the North Wales Power Co., Ltd., on July 2nd. Members travelled from Birmingham by train and motor coaches and, after viewing the dams, reservoir, pipe-line, and transmission lines, returned to the power station for tea.

MERSEY AND NORTH WALES (LIVERPOOL) CENTRE.—The annual report for the 1929-30 session shows that nine meetings were held at which the average attendance was 106, excluding the Faraday Lecture at which 850 people were present. There was a marked increase in the number of members who took part in the discussions; two joint meetings were held with the Liverpool Engineering Society. The membership totals 465; the expenses of the session amounted to £300. The Dennis trophy golf competition in May resulted in £75 8s. 3d. being handed over to the I.E.E. benevolent fund, as against £38 14s. 4d. in 1929.

STUDENTS' SECTION.—An average attendance of 32 at the ten meetings held compares with 33 during 1929.

Institution of Mechanical Engineers.

Members of the Institution, which this year was incorporated by Royal Charter, visited the works of Messrs. R. A. Lister and Co., Ltd., at Dursley, Glos., during the annual summer meeting held in Bristol this week. Among other things, the visitors were shown the new cold-starting Diesel engines, both small and large, which Messrs. Lister are now making on mass-production lines.

Our Personal Column.

Electrical men are invited to enable us to keep readers of the "Electrical Review" posted concerning their movements.

We present herewith photographs of **Mr. John Wilson**, O.B.E., M.I.E.E., M.Inst.T., and **Mr. Ratcliffe Wright**, A.M.I.E.E., whose appointments under the Buenos Ayres Western Railway Company were referred to in this column last week. Mr. Wilson, as then stated, has relinquished the post of chief electrical engineer to the railway in order to take up the appointment of traffic and transport manager. Mr. Radcliffe Wright has succeeded him as chief electrical engineer. Mr. Wright received his technical education and training at Ashton-under-Lyne and Manchester, and subsequently joined the staff of the Newcastle-upon-Tyne Electric Supply Co., Ltd., as a junior assistant engineer, later becoming a shift engineer with the Cleveland & Durham County Co., and mains and sub-stations engineer, &c., for the Bishop Auckland district. During ten years with the North-East Coast power supply companies, Mr. Wright naturally saw considerable development in the supply of electric power, and he took part in the operation of coal-fired and waste-heat generating stations, h.p. transmission line work, industrial installations and mining plants, and the power supply for the electrified sections of the North-Eastern Railway. In 1915 he joined the staff of the Buenos Ayres Western Railway in charge of the construction work on the high- and low-pressure cable system, track distribution, rotary and static sub-station plant, &c., for the electrification of the suburban lines, workshops, &c., and on the completion of the construction work in 1923 was made chief assistant to the electrical engineer. The electrical engineer's department of the Buenos Ayres Western Railway operates a 30,000-kW oil-fired generating station, 20,000-volt cable transmission system, four rotary sub-stations for traction, six static sub-stations for railway workshops and lighting supplies, electric rolling stock running 14½ million coach km. and carrying 25 million passengers per annum, third rail and overhead track equipment, in addition to handling all lighting installations, motors and electrical appliances on the railway system and the electric lighting and heating in steam rolling stock, &c.

Mr. John Wilson, M.I.E.E.,

Recently appointed to be Traffic and Transport Manager of the Buenos Ayres Western Railway Co.

Mr. Arthur Pluck, borough electrical engineer at Brecon, has been appointed to a similar position at Congleton, subject to his services as clerk of works for the electricity scheme being satisfactory. Mr. Pluck has been appointed clerk of works at a salary of £300 per annum.

Mr. H. W. C. Thompson, of Evesham, assistant district engineer to the Shropshire, Worcestershire and Staffordshire Electric Power Co., was recently married to Miss D. M. Mean, of Edgbaston.

Mr. Ratcliffe Wright, A.M.I.E.E.,

Appointed Chief Electrical Engineer of the Buenos Ayres Western Railway Co.

Mr. J. G. Glassco, manager of the Winnipeg hydro-electric system, **Mr. C. A. Magrath,** chairman of the hydro-electric Power Commission of Ontario, **Dr. T. H. Hogg,** consulting engineer, and **Mr. F. A. Gaby,** chief engineer of the Commission, are included in the delegation of Canadian electrical experts who, according to the *Evening Standard*, are visiting this country during the first fortnight of the current month to examine our manufacturing and generating plants.

Mr. C. E. Vance, who has been with the British Electric Traction Co., Ltd., since 1900, has retired under a reorganisation of the engineering staff consequent upon the sales of various enterprises. **Mr. A. P. Fitzmaurice,** who joined the company in 1905, has also retired.

Mr. Cecil Hodges has been appointed director of sales for the Power Equipment Co., Ltd., as will be noted from an announcement appearing in our "Business Notices" to-day.

Mr. R. H. Lee, electrical station engineer at Devonport Dockyard, has been appointed to Gibraltar.

Capt. R. C. Petter is taking charge of the home and overseas sales organisation of Petters, Ltd., during Mr. R. J. Norton's absence in South Africa.

Mr. James Fisher, technical assistant at the Halifax power station, has been appointed charge engineer, his salary to be increased by £50 per annum, with a further increment of £50 a year hence. He succeeds Mr. Warman, who has secured an appointment at Bristol.

Obituary.

Mr. J. F. Fulton.—We regret to learn of the death of Mr. J. F. Fulton, managing director of Messrs. Santon, Ltd., of Newport, Mon., after suffering extending over several years. He passed away at his home on Wednesday evening last week.

Dr. O. Feuerlein.—The death is announced from Berlin, Germany, at the age of 67 years, of Dr. Ing. Otto Feuerlein, one of the leading German authorities on modern electric lamp manufacture.

Financial Section.

New Companies, Returns of Share Capital, Debenture Charges, Reports of Electrical Companies, Dividend Changes, Transactions in Stocks and Shares.

New Companies Registered.

Young & Wildsmith, Ltd.—Private company. Registered June 21st. Capital £11,000 in £1 shares (7,000 7 per cent. cumulative preference and 4,000 ordinary). Objects: To acquire the business of electrical and radio distributors and merchants, and factors of all kinds of electrical apparatus and goods carried on by E. D. Young and A. B. Wildsmith, trading as "Young & Wildsmith," at 35, Little Russell Street, W.C., and elsewhere. The permanent managing directors are: E. D. Young, 18, Warwick Park, Tunbridge Wells; A. B. Wildsmith, 58, Cleveland Road, Ealing, W.13. Qualification of directors: 500 preference or 100 ordinary shares. Registered office: 35, Little Russell Street, W.C.

Douglas Electric Lighting Co., Ltd.—Private company. Registered June 27th. Capital, £3,500 in 3,450 preference shares of £1 each and 1,000 ordinary shares of 1s. each. Objects: To carry on the business of electric lighting engineers, electricians, &c. The directors are:—J. E. Percival, Southlands, Russell Hill Road, Purley, Surrey; B. G. Donne, The Lodge, W. Byfleet; J. C. Pidgeon, "Cobham," Sanderstead Road, Purley, Surrey; S. H. Rawlings, Devon Lodge, Clacton-on-Sea, Essex. Registered office: 21, Douglas Street, S.W.1.

Mutoflashads, Ltd.—Private company. Registered June 21st. Capital, £2,000 in £1 shares. Objects: To enter into a lease with the Union Cold Storage Co., Ltd., relating to certain premises in Westmoreland Lane, Newcastle-on-Tyne; to adopt an agreement with Transmutograph, Ltd., and J. P. Naylor, and to carry on the business of designers and manufacturers of and dealers in and licencees of electric, magnetic, revolving, changeable, coloured, illuminated and other signs, &c. The subscribers (each with one share) are: S. Smith, Ellerby Lodge, Grove Road, Gosforth, tea merchant; D. Smith, 10, King Edward Road, Newcastle-on-Tyne, tea merchant. S. Smith shall be sole director with £100 per annum as remuneration. Solicitors: Dickinson, Miller & Turnbull, Newcastle-on-Tyne.

Forrest Fawn, Ltd.—Private company. Registered June 26th. Capital, £100 in £1 shares. Objects: To carry on the business of electricians and mechanical engineers, manufacturers of and dealers in electrical apparatus, &c. The directors are: R. Forrest Preston, 18, St. Johns Park, Blackheath, S.E.3, engineer; F. Thorne, 27, Hardy Road, Blackheath, S.E.3, building contractor. Registered office: Dunedin House, Basinghall Avenue, E.C.2.

Ozofone Equipment Co., Ltd.—Private company. Registered June 21st. Capital, £1,000 in 5s. shares. Objects: To market all apparatus appertaining to health and hygiene (electrical or otherwise), to acquire the sole selling rights of any specialities of a utility nature, &c. The directors are: W. T. Russell, "Rusrene," School Road, West Wickham (director of Rus-Sun-Ray, Ltd.); G. T. Melrose, 93, Richmond Road, Ilford (director of Rus-Sun-Ray, Ltd.); A. E. Jacobs, 14, Claremont Road, Seaford, Sussex (director Blatchington & Bonchurch Laundry Co.). Qualification: 100 shares. Registered Office: 121, Kingsway, W.C.2.

Midland Motor Sign Co., Ltd.—Private company. Registered June 25th. Capital, £1,500 in £1 shares (500 7 per cent. cumulative preference and 1,000 ordinary). Objects: To act as agents for the sale of the electrical or other devices or goods manufactured or sold by the British Motorsign Company, Ltd., or any other company or firm manufacturing or selling similar articles; to take over an agency for the sale of such goods manufactured by the said British Motorsign Co., Ltd., recently obtained by C. B. Knight and N. H. C. Whitten, trading as the Midland Motorsign Co., and to carry on the business of manufacturers of and dealers in electrical or other signs or advertising devices, &c. The permanent directors are: C. B. Knight, Kenilworth, Stoneygate Road, Leicester; N. H. C. Whitten, The Bungalow, Woodhouse Lane, Quorn, Leicester; T. F. Almond, Ruskin House, Rothwell, Northants; A. R. Almond, Ruskin House, Rothwell, Northants. Qualification: 200 shares. Registered office: 115, London Road, Leicester.

Sheringham Daylight Co. (1930), Ltd.—Private company. Registered June 25th. Capital, £5,000 in £1 shares. Objects: To acquire the business of artificial daylight lamp manufacturers carried on by D. Warr King as the "Sheringham Daylight Co." The directors are: Sir E. Burford Horlick, 27, Norfolk Street, Park Lane, W., manufacturer; Lt.-Col. J. N. Horlick, 93, Eaton Place, S. W., manufacturer; O. P. Horlick, Norton, Burnham, Bucks, manufacturer; G. Butler, Darjeeling, Slough, Bucks, manager; H. W. Weathersbee, Broom Cottage, Stoke Poges Lane, Slough, Bucks. sales manager; D. W. King, 11, Edith Villas, W. Kensington, W.14. Registered office: Horlick's Estate, Slough, Bucks.

Warrington Electric Cables, Ltd.—Private company. Registered June 26th. Capital £2,000 in £1 shares. Objects: To carry on the business of manufacturers and drawers of and dealers in all kinds of wire and metal goods, hard and soft rubber goods, and all kinds of goods used by the electrical, radio and telephone businesses, &c. The permanent directors are: J. Geldsetzer, 20, St. Barnabas Street, Lovely Lane, Warrington; E. P. Saxelby, 51, Somerset Road, Handsworth (director Lloyds Cycles, Ltd.). Registered office: Aikin Street, Warrington.

Stanleys Radio (1930), Ltd.—Private company. Registered June 26th. Capital, £1,000 in £1 shares. Objects: To acquire the business of a manufacturer of, and dealer in, all kinds of wireless apparatus now carried on by M. Skulnick, at 174, London Road, and 91, Victoria Street, Liverpool, as "Stanley and Co." The subscribers (each with one share) are: M. Skulnick, 71, Mulgrave Street, Liverpool, ironmonger; Miss K. Skulnick, 71, Mulgrave Street, Liverpool. M. Skulnick is permanent managing director. Registered office: 174, London Road, Liverpool.

A. E. Chesters, Ltd.—Private company. Registered June 20th. Capital, £2,000 in £1 shares. Objects: To carry on the business of electricians, mechanical engineers, &c. The directors are: A. E. Chesters, 16, Hamlet Road, Wallasey, Cheshire, electrical engineer (permanent managing director and chairman); J. H. Green, 40, Kintore Road, Cressington, Liverpool, managing clerk. Qualification: One share. Registered office: 2, Atherton Street, Wallasey, Cheshire.

Radio Retailers, Ltd.—Private company. Registered June 30th. Capital, £1,500 in £1 shares. Objects:—To carry on the business of wireless and electrical accessory dealers, electrical engineers and merchants, gramophone and musical instrument and accessory dealers, &c. The directors are:—M. Hyde, address not stated; R. S. Andrews, 448, Strand, W.C.2.

Lusign, Ltd.—Private company. Registered June 27th. Capital, £1,000 in £1 shares. Objects:—To acquire from W. Brown the sole and exclusive licence to manufacture and use in Great Britain the apparatus comprised in an invention of advertising signs covered by patent No. 324,230, and also to acquire from him the benefit of the trade mark "Lusign," and to carry on the business of inventors and manufacturers of electrical and other signs, &c. The permanent directors are:—W. Brown (chairman), The Old Mill, Castor, Peterborough, wholesale clothing manufacturer; Mrs. M. E. B. Brown, The Old Mill, Castor, Peterborough.

Anglo-Swiss Electrical Co., Ltd.—Private company. Registered June 30th. Capital, £500 in £1 shares. Objects:—To carry on the business of manufacturers, importers and exporters of, and wholesale and retail dealers in, compasses, barometers, weighing and measuring instruments, surveying and optical instruments, violet-ray and X-ray tubes and apparatus, electrical and scientific equipment and supplies of all kinds, &c. The subscribers (each with one share) are:—A. Fletcher, solicitor, and H. C. Edwards, 1, Finsbury Square, E.C.2, bookkeeper. A. Fletcher signs documents as director. Registered office: 1, Finsbury Square, E.C.2.

Naylor (Foreign Rights), Ltd.—Private company. Registered June 21st. Capital, £100 in 1s. shares. Objects: To acquire the sole agency for the sale of all or any of the foreign rights in any invention, whether patented or not, belonging to James Priestnal Naylor, relating to every description of electric sign, &c. The subscribers (each with one share) are: Ella B. Allen, 3, Staple Inn, W.C.1, private secretary; Vera Giles, 13, Northumberland Avenue, Squirrels Heath, Romford, Essex, solicitor's clerk. The first directors are to be appointed by the subscribers. Registered office: 3, Staple Inn, Holborn, W.C.1.

Webb Condenser Co., Ltd.—Private company. Registered June 21st. Capital, £500 in £1 shares. Objects: To carry on the business of manufacturers of and dealers in instruments and apparatus used in connection with wireless telegraphy, reproduction of sound and television, &c., and to adopt an agreement with L. C. Walker. The directors are: A. E. Cox, 24, Elmfield Road, Chingford, Essex, accountant; L. C. Walker, 79, St. Georges Avenue, Tufnell Park, N.7. Registered office: 42, Hatton Garden, E.C.2.

Official Returns of Electrical Companies.

"M.P.A." Wireless (1930), Ltd.—Particulars filed of £25,000 debentures and bonus of 12½ per cent. authorised June 13th, 1930, charged on the company's undertaking and property, present and future, including uncalled capital and goodwill, the amount of the present issue being £17,580.

Ridged Cone Co., Ltd.—H. O. Barnsley, of 44, Bedford Row, W.C.1, was appointed receiver and manager on June 16th, 1930, under powers contained in debenture dated November 30th, 1929.

Morse Chain Co., Ltd.—Satisfaction in full on January 14th, 1926, of deposit of deeds dated February 6th, 1920, and registered February 16th, 1920. (Notice filed June 21st,1930). (According to the register of mortgages, the deposit of deeds registered February 16th, 1920, originally secured all moneys due to the bank.)

H. E. Steel, Ltd.—Particulars filed of £5,000 debentures authorised June 17th, 1930, charged on the company's undertaking and property, present and future, including uncalled capital, if any, the amount of the present issue being £700.

Belshaw & Co., Ltd.—Particulars filed of £5,000 debentures authorised June 11th, 1930, charged on the company's undertaking and property, present and future, including uncalled capital, the amount of the present issue being £3,500.

Harmony, Ltd.—A. G. Cox of 7, Duke Street, Adelphi, W.C.2, ceased to act as receiver on June 16th, 1930.

Clark & Moir, Ltd.—Issue on June 6th, 1930, of £1,500 debentures, part of a series already registered.

D. H. Bonnella & Son, Ltd.—Satisfaction on June 5th, 1930, of mortgage or charge dated September 10th, 1923, and registered September 13th, 1923 (according to the register of mortgages, the mortgage or charge registered September 13th, 1923, originally secured all moneys, &c.), Land Registry Charge on leasehold premises Nos. 46 and 48, Osnaburgh Street, London, and a capital redemption policy and a life policy for £11,000 and £1,000, respectively, dated June 5th, 1930, to secure £12,000. Holders: Norwich Union Life Insurance Society, Surrey Street, Norwich.

North Wales Power Co., Ltd.—Satisfaction to the extent of £279,530 (being balance) on April 23rd, 1930, of trust deed dated July 29th, 1919, and second supplemental trust deed dated November 2nd, 1921, and registered January 20th, 1920 and November 21st, 1921, respectively, securing £1,000,000 (of which only £500,000 was issued).

Radiograph, Ltd.—Mortgage debenture dated June 17th, 1930, to secure £400, charged on the company's undertaking and property, including uncalled capital. Holder: Mrs. N. West, 10, Church Hill Road, Handsworth, Birmingham.

City Notes.

General Electric Co., Ltd.

Presiding at the annual meeting held in London on June 25th, **Sir Hugo Hirst, Bart.**, expressed satisfaction at the further substantial progress made. It was gratifying that in a year full of shocks with which they were all too familiar, the trading account showed a profit of £1,179,000, an increase of over £90,000. After going through the various items in the balance sheet, the speaker said that the results shown were not due to accident of "fluky" contracts or to an automatic flow of business into their channels; they were due to the greatest efforts of brain and energy on the part of the management and all classes of the workers. Electrical manufacturing was not an easy business. The electrical industry in all its branches was still in a state of evolution. Whatever they made and sold to-day might be supplanted by something new to-morrow and, whilst their publicity, sales and distributing departments were busy filling the works with orders for what might be to-day standard material, hundreds of minds in the company were constantly busy preparing for to-morrow. Turning to recent achievements, they had successfully undertaken the manufacture of turbo-alternators up to 50,000 kW, having a speed of 3,000 r.p.m. The company was the first in this country to obtain an order for machines to run at this speed. They had developed hydro-electric plant and supplied a number of sets to the Palestine Electric Corporation. Progress had been made in their oil engine department at Erith. A number of engines had been supplied abroad, whilst the largest oil engine installation in this country was that of a London power house employing their machines. The development of the Grid scheme had called for considerable extensions at the switchgear works, and many noteworthy achievements stood to their credit. Until quite recently the maximum size of outdoor oil circuit-breakers had a breaking capacity of 1,000,000 kVA at 44,000 volts. As a result of their success in the many problems of design, they were now engaged in the manufacture of outdoor breakers for the Central England section of the grid scheme, having a breaking capacity of 1,500,000 kVA at 132,000 volts. The increase in size and capacity of metal-clad switchgear had also been remarkable. They had completed units of 750,000-kVA breaking capacity, and were building gear up to 1,500,000 kVA in connection with the Grid. Other developments of note related to protective gear for overhead lines at 132,000 volts, line contact circuit breakers, and high-speed breakers. In transformers the new high-pressure works at Witton had completely revolutionised their position. The really remarkable progress which the company had made in this particular field could best be gauged if it was realised that up to a few years ago the maximum size of transformer manufactured by them was for 5,000 kVA only. To-day they were carrying out orders for the Grid for 30,000-kVA 132,000-volt transformers, and could undertake with complete success the building of transformers up to 75,000 kVA in one unit—that was, transformers with a capacity 15 times as great as two years ago, whilst the voltages dealt with were the highest used in modern electrical practice. The amount of work in design and research necessary to accomplish such an outstanding advance would be fully appreciated. Progress in electric traction had also been rapid. They obtained a contract for the Manchester-Altrincham section of the L.M.S. and L.N.E.R. Railways, which was the first order ever placed in this country for equipment for trains operating at 1,500 volts, which was the standard voltage fixed by the Ministry of Transport Committee, whereas previously the usual voltage for traction work was 600 volts only. Other contracts included equipments for the new tube railway on the Buenos Ayres central terminal system, and Diesel-electric locomotives for India. A contract for 1,000 motors had been placed with the company by the London Electric Railway. They had been successful in marine work, having obtained a contract for the complete electrification of a cement-carrying vessel for Canada. The main propulsion of the ship was by electric motor, and they had secured the order for an electrically-propelled passenger liner of 25,000 tons for the Furness Withy Line. Many illuminating engineering installations had been carried out. In connection with the application of light-sensitive devices to many industrial problems, the photo-electric cells developed by their research laboratories had an important future. Progress in the development of projector lamps had resulted in the production of a number of successful British films for the first time in this country, by means of gasfilled lamps. In this field they had done real pioneer work. In heating and cooking steady development had taken place in domestic cookers, and high-temperature furnaces had been developed for a multiplicity of purposes. Electric furnaces up to one ton capacity for melting copper, aluminium and other non-ferrous metals, had been included in the year's work. Mention was made of the contract obtained by the Pirelli-General Cable Works, in which they were partners to the extent of 50 per cent., for the 132,000-volt oilfilled cable which linked up the north and south sections of the grid scheme in the London area. There had been rapid growth in development at their telephone works. During the year automatic equipments had been installed to the extent of about 50,000 lines in the London and Birmingham areas, whilst altogether at home and abroad, exchange equipments to a total of 80,000 lines had been erected or shipped. There had been considerable development in all types of automatic telephone equipment, and an entirely new private automatic branch exchange system, known as the "Auto Cord," had been developed.

In broadcasting sets they continued to hold a leading position, in spite of ever-changing designs and great competition. Their research laboratories had carried out work on many other subjects, including large transmitting valves, thermostats, dust iron cores for loading coils, and searchlight carbons, the last in collaboration with the Army and the Navy. They were also committed to constant improvements in designs of thousands of electrical commodities included under the general phrase "domestic electrical supplies," which included the finding of new raw materials, research in metals, alloys and gases, experiments as regarded high temperature, and so on. All this work was surely a romance of development, covering as it did not only one or two branches but a complete field of electrical science and engineering.

Speaking of the national value of a manufacturing company such as the G.E.C. encouraged him to publish a few figures demonstrating the contribution which they made towards national welfare. First and foremost, they employed nearly 25,000 workers, with a wages and salary list approaching £4,000,000 annually. They were buying raw materials from

the different industries of the country, such as steel, pig-iron, brass, copper and sundry raw materials, amounting to nearly 3½ millions. They were paying for coal, coke, electricity supply, gas and water, over £200,000 per annum; for freight, cartage, and shipping, about £250,000 per annum; telegrams, telephones, and postage, over £50,000 per annum. Local rates and taxes, income tax under Schedule (A) and (B), unemployment insurance, national health and pension insurance, and various contributions to charity, welfare and education, amounted to nearly £450,000. They were proud to record the ever-expanding activities of the company in building up an export business, which was now running into millions—nearly double what it was four or five years ago. What this figure meant in wages paid to British labour he could leave it to them to imagine.

In view of their growing importance as a national asset he was sure that the shareholders would continue to support them in their endeavour to preserve British control in the company.

The aspirations of the overseas Dominions to have industries of their own had at last affected their overseas policy. Through his visit to the Dominions 18 months ago, he gained personal evidence of the need for changing their course. They had hitherto produced in this country, and sold the products of their home works overseas. The demand of Australia to establish its own industry was, in his opinion, justified so long as the demand in that country for any particular commodity was sufficiently large to feed an efficient economic unit in any particular industry. To meet that situation, they had conferred with certain colleagues in the trade to act conjointly in an endeavour to give Australia what it wanted and what it was entitled to, so far as the electrical industry was concerned, and they were further making endeavours to link up with certain industries already existing. Before long they would be able to make an announcement as to how far they had gone in that direction. The work could only progress slowly, as it required collective effort. They hoped that, in return for their help to Australia to produce efficiently what they thought it could produce for its own requirements, the unreasonably high tariffs on goods which, in their opinion, Australia could not efficiently produce, might be modified for the benefit of British works and workers.

Unless British manufacturers in other industries stepped in quickly other countries were prepared to take their place, with consequences that he could only think must be disastrous to the country and the Empire. Sir Hugo closed with a note of warning. Their progress last year was mainly due to results of the beginning of the year. As a matter of fact, the ratio of increase was dropping from month to month. In the eyes of many the outlook was sad and things looked like getting worse. He was, however, not despondent. He realised the unhappy conditions existing in some of our older industries. He realised the terrible problem confronting us through the unemployment of nearly 2,000,000 people, which meant, with their dependants, that 8,000,000 of our population had to live on unemployment insurance, reducing their purchasing power to a minimum. He realised the fact of the terrible taxation to which we were subject and its effect on industry, but all these were matters which by courage and by great efforts might be combated. They were not being grappled with as they should because, at the moment, courage and confidence in the future was failing. He ascribed this state of affairs to an exaggerated psychological effect which wild gambling on the stock exchanges of the world had produced: shock after shock had happened in the money market which, for the time being, reduced all values far below normal, and had created an atmosphere which, for the moment, had paralysed even the most enterprising minds. He thought the pendulum had swung too much to the left, and he fancied he saw symptoms that, once the paper losses were realised and forgotten, the more normal swing would return and restore our chief characteristic as a nation—that was, we were best when we were with our back to the wall. When that moment came, he felt that a period of steady upbuilding would begin again. If we were assisted then by a Government that believed in safeguarding our industries so as to put a stop to ever-increasing imports which he recently pointed out in the Press, if a practical lead were given to fostering inter-Imperial trade, he for one felt that we could carry the great national burden with dignity, could gradually reduce effectively the evils from which we were suffering, and the electrical industry would be made to play an important part in that reconstruction which he visualised. With such views, his belief in the future of the company and its continued progress was unbounded. The bonus of 4 per cent. was recommended in the light of the above reflections; it was meant to be a bonus for this year, and not a promise of increased dividends in the future unless, of course, his optimism were borne out by fruits sooner than he dared to hope.

Mr. E. G. Byng seconded the motion and the report was adopted.

On the motion for the re-election of the retiring directors, **Sir Edwin Cornwall** said that the board was aware that Lord Midleton, Sir William Burton and himself (the speaker) held 750,000 shares in the company; with that large interest Sir Hugo could quite understand how heartily they welcomed the eloquent and powerful address which he had given to the shareholders and how anxious they were that the prosperity which the company had had should continue in the future to the fullest extent. The chairman was also aware of the fact that some correspondence had taken place which had raised the question as to whether the holdings of Lord Midleton, Sir William Burton and himself (Sir E. Cornwall) were held by them under full British control. They had come to the meeting to say that those shares were absolutely owned and controlled by them and they wished to tender their votes. From the correspondence which had taken place there seemed some doubt as to whether the directors frankly admitted their right to vote at that meeting. If the chairman raised no objection they would willingly vote for the re-election of the directors, but if on the other hand on a legal interpretation the chairman was advised that he could not accept their votes, they would in order to test the matter formally tender their votes and then ask for a poll.

The **Chairman** said he was obliged to Sir E. Cornwall for the pleasant manner in which he had introduced a subject which presented difficulties to both of them. The directors had thought fit in their endeavour to do their duty to act according to the Articles of Association and, without making any reflection whatever on the good faith of Sir Edwin Cornwall and his two co-shareholders, they had come to the decision that at the moment they had to raise objection to their voting powers. There was a way of testing who was right, other than at that meeting. If Sir E. Cornwall and his two friends approved of the re-election of the directors that was all right, but if it was a question of accepting their right to vote, that matter would have to be considered in another place.

Sir Edwin Cornwall said he quite agreed that the general question was not a matter for discussion at the annual meeting, but that was the only place where they could tender their votes and he wanted to ask the chairman quite definitely whether he allowed them to vote or not.

The **Chairman:** I regret to say I cannot allow your votes.

Sir Edwin Cornwall asked that it should be recorded that he, together with Lord Midleton and Sir William Burton, had attended the meeting and voted on a show of hands for the adoption of the report, but that their votes were challenged on this resolution.

The chairman remarked that it was quite clear that there was nothing personal in the matter, but the directors were simply carrying out the certificate which they had signed.

Sir Edwin Cornwall said he could not say it was not personal, but it was not unfriendly. They would go on tendering their votes. In order to safeguard their legal interests he asked that a poll be taken on the resolution.

The poll was at once taken and the chairman declared the resolution carried unanimously as he said the only three gentlemen opposing it were Sir E. Cornwall, Lord Midleton, and Sir William Burton and their votes had been rejected.

Lord Midleton, in thanking the chairman for presiding, said he could assure them that the shares held by himself, Sir E. Cornwall and Sir W. Burton were held in the best interests of the company and of the shareholders. They were not in any foreign interest and were not under any foreign control whatever.

The Ferranti Prospectus.

On Tuesday last Messrs. Ferranti, Ltd., offered for subscription 250,000 7 per cent. cumulative preference shares of £1 each at par. The prospectus showed the directors to be Messrs. V. Z. de Ferranti (chairman), R. W. Cooper (vice-chairman of the British Aluminium Co., Ltd.), H. W. Kolle (director of Babcock & Wilcox, Ltd.), and A. Whittaker (director of Phillips Rubber Soles, Ltd.). It was mentioned that the original business was commenced in 1882 by the late Dr. S. Z. de Ferranti, and that the present company was formed in 1905, and reference was made to the company's products. The total net assets as at June 30th, 1929, were given as £567,738. The average annual profit for the past seven years was £74,267, and from 1925 to 1928 the ordinary dividend was 20 per cent.; in 1929, when the capital was increased by a bonus issue, the dividend was 12 per cent., maintaining the rate of 20 per cent. The proceeds of the issue are to be devoted to paying off an overdraft of £151,000 and to providing further working capital, estimated at £76,000.

The Newcastle Debenture Issue.

The Newcastle-upon-Tyne Electric Supply Co., Ltd., on Tuesday this week, made a public issue of £2,300,000 5 per cent. consolidated debenture stock at the price of 96 per cent. The proceeds are required for paying-off the company's 6 per cent. second mortgage debenture stock and the outstanding debentures of the Tees Power Station Co., Ltd., the County of Durham Electrical Power Distribution Co., Ltd., and the Cleveland and Durham Electrical Power, Ltd. The net assets are sufficient to cover the present issue more than three and a half times. The ordinary dividend for the last three years has been 6 per cent.

Delhi Electric Supply and Traction Co., Ltd.

The annual meeting was held on June 26th, Mr. K. A. Scott-Moncrieff (chairman) presiding. In presenting the report and accounts (ELEC. REV., June 27th, p. 1209), the chairman said that the year under review was one of bad trade throughout India, but in spite of difficulties, business was extended by the addition of 1,103 new consumers, and sales increased by 844,478 kWh to 5,808,626 kWh. Turning

to the tramway undertaking, he said that bad trade affected receipts to some extent, there being a decrease of nearly 3 per cent., and a decrease of 2½ per cent. in the number of passengers carried. They had been experimenting with an improved form of car-body, which was now being adopted, and they hoped to equip the whole of their cars with this new type during the current year. The report and accounts were adopted.

Cables and Wireless Results.

The directors of CABLES & WIRELESS, LTD., announce that they are unable to recommend a dividend on the "A" or "B" ordinary shares for the company's first period (21 months).

IMPERIAL & INTERNATIONAL COMMUNICATIONS, LTD., states that the profit for the period was £2,023,155, or £708,912 less than the standard revenue above which 50 per cent. of the surplus has to be passed on to the users of the system.

MARCONI'S WIRELESS TELEGRAPH CO., LTD., has declared an ordinary dividend of 15 per cent. in respect of 1929 (against 20 per cent.), while the 7 per cent. cumulative participating preference shares receive an extra 5 per cent. (against 10 per cent.).

Barcelona Traction, Light and Power Co., Ltd.

Presiding at the annual meeting in Toronto, Mr. Miller Lash (vice-president) said that the large increase in the operating expenses had been mainly due to a drought of unprecedented severity and duration, but since January last rains had fallen so that the water conditions had greatly improved enabling steam generation to be discontinued. Regarding the operating companies in Spain the chairman mentioned that preliminary work had been commenced on a hydro-electric installation at Gavet, in the Camarasa district, which would have a capacity of 23,000 kW, and it was anticipated that this development would be completed during the year 1932. The report and accounts were adopted.

Kiesselbach Steam Accumulators.

The report for the period January 16th, 1929, to March 31st, 1930, shows a loss of £17,588. The directors state that in view of the depression in industry and the consequent restriction on all capital expenditure, the company has passed through a difficult period. They are of opinion, however, that when conditions become more normal, substantial business will be obtained, particularly having regard to the excellent results which are being shown by the first plant on the system now installed and working in this country.

Telephone Rentals, Ltd.

Presiding at the first annual meeting on June 26th, Mr. F. T. Jackson (chairman) said that the profit for the year indicated that the business was not affected by trade depression to the same extent as most industrial concerns. The principal reason for not recommending a higher final dividend (2½ per cent.) was because there was a great deal of rental business on offer. In the first five months of the current year there was an increase of 48.4 per cent. in the number of telephones rented out. The report and accounts were adopted.

W. & T. Avery, Ltd.

The accounts, subject to audit, show a balance at the credit of profit and loss account, including the amount brought forward of £173,810. It is proposed to pay a final dividend of 10 per cent. on the ordinary shares, making 15 per cent. for the year, and to carry forward £59,035.

W. T. Henley's Telegraph Works Co., Ltd.

The directors recommend a final dividend on the ordinary shares of 2s. 6d. per share, making, with the interim dividend of 1s. 6d. per share paid in December last, 4s. per share for the year. They also recommend a cash bonus of 2s. per share. A similar distribution was made last year.

Fife Tramway, Light and Power Co., Ltd.

The directors have decided to call a meeting of shareholders at an early date to authorise the company to repay to the holders of the 500,000 six per cent. cumulative £1 preference shares of the company, the amount of their holdings.

Kensington and Knightsbridge Electric Lighting Co., Ltd.

Interim dividend of 9d. per share, less income tax, on the ordinary shares.

London Electric Wire Co. & Smiths, Ltd.

An interim dividend of 1¼ per cent., less tax, is recommended on the ordinary shares for the half-year, payable June 30th.

Swiss Company.

The *Brown Boveri Co.*, of Baden, after placing 500,000 fr. to the ordinary reserve fund, proposes to maintain the rate of distribution for 1929 at 9 per cent.

Stocks and Shares.

TUESDAY EVENING.

THE atmosphere of finance continues to vibrate with the expectation that the Bank Rate may be reduced to 2½ per cent. within the comparatively near future. The anticipation of such a reduction—which, by the way, would have the effect of halving the Rate as compared with that which ruled at the beginning of the year—serves to maintain the prices of gilt-edged securities, most of which are steadily moving upwards. It is as though the investor of the present day is chary of putting money into stocks and shares other than those within the group which may be described as being practically liquid cash. People cannot afford to take the small rate that is allowed by the banks on deposit money. On the other hand, they have not sufficient confidence in the trade and industrial outlook to induce purchases of securities other than those in the front rank, which are dependent for their price movements upon the conditions which prevail in the money markets here and in America. The result is seen in the rises which occur every day in gilt-edged stocks.

The Demand for Sound Shares.

Repercussion of this tendency makes its influence felt amongst fixed-interest issues of industrial and other such companies, and the markets for these securities are being closely searched in the carrying-out of the determination to stick to safety. In such markets, for instance, as that for Home electricity supply companies, it may be said that the same tendency prevails, for these companies are mostly in a position of financial strength inferior to very few. Although on the yields which the shares offer, prices look high, the return on the shares compares favourably with that which is offered by other sound investments. Many of the stocks to which attention has been directed here during the past six months as being on offer, and in fairly large blocks, are now in hands likely to hold these stocks permanently. The inevitable sequel is, of course, that there is not a great deal of floating supply to be obtained, and new issues offering sound security, combining a reasonable rate of interest, attract ready attention from the investor.

New Issues.

The Newcastle-on-Tyne Electric Supply Company has made an issue of 5 per cent debenture stock at 96. The issue is to redeem the company's own 6 per cent. second mortgage debenture, and the debenture stocks of certain subsidiary companies. These debentures total a little over £2,000,000, and the present issue of consolidated debenture stock is for £2,300,000. The company's ordinary shares stand at 22s. 6d., and the dividends for each of the past three years was 6 per cent. The 7 per cent. preference are quoted at 26s., on which the yield is £5 7s. 8d. per cent. The new debenture, without taking redemption into account, will give a return of £5 4s. per cent.

To-day, Tuesday, an offer has been made of 250,000 7 per cent. preference shares by Ferranti, Limited, the well-known manufacturers of transformers, electric house service meters, instruments, &c. The shares are offered at their par price of £1. The business is within a couple of years of completing its half-century.

Fife Tramway Sales.

The Fife Tramway Light & Power Company proposes to call meetings at an early date to authorise the company to repay the half-million 6 per cent. cumulative preference shares of £1 each. The company, it will be remembered, paid off its 5 per cent. debentures and 5½ per cent registered notes about a year ago, when it sold its power and light undertaking to the Scottish Power Co. The company has recently sold its omnibus interests, and this is the reason for the proposed repayment of the preference shares. The assets for the ordinary shares are represented by the tramway part of the company's business, and a substantial sum in cash. This method of dealing with the capital, as the assets were sold by degrees, is strictly correct. We believe that a proposal was advanced for turning the company into an investment trust, but this plan was abandoned. The preference shares moved up to 19s. on the publication of the company's proposal to repay them. This represented a rise of about eighteen-pence.

Home Electricity Supply.

Metropolitan Electric ordinary shares are a shade harder at 40s. The price has recently been dull by reason of the falls which have taken place in American utilities, because, although the Metropolitan Electric Supply Company has nothing to do with the United States, its shares were eagerly bought some few months ago by people connected with Anglo-American interests, and the impression became current that the company might be taken over by the Greater London & Counties Trust on the basis of a higher price per share than that then ruling. Besides this, however, there was a more material ground for improvement in the raising of the company's dividend from 9 per cent. for 1928 to 10 per cent. for 1929, followed by the issue of an excellent report. Notting Hill preference are quoted ex the dividend of 6s. per share gross, but the price has been left unchanged at 10¾, this being equivalent to a rise of the amount of the deduction. Electric Supply Corporations are also ex, and here, too, the price

remained at 47s., the same as it was before the dividend came off. County of London preference at 23s. ex dividend show no actual change. The new shares keep at about 7s. 9d. premium. City of London ordinary are 6d. up, at 33s. 9d. London Power 5 per cent. debenture is easier at 99.

Suburban, Provincial, Overseas.

Scottish Power new shares have dipped to a small discount. Atlas ordinary are unchanged at 25s., and British Power and Light at 13s. 9d. The suburban and provincial group is placid, Northamptons being 45s., Richmond (Surrey) 42s., Isle of Thanet 27s. 9d., and Egham and Staines 31s. 3d. Chiswick Electric 4½ per cent. debenture advanced to 91½. The Indian list has settled down to quieter conditions than those recently prevailing. Calcutta Electric Supply are 45s., Madras 26s. 3d. ex dividend, and Delhi ordinary 35s. Calcutta Tramways ordinary are ex dividend at 12s. 6d., the 5 per cent. preference, also xd., being quoted at the same figure. Cape Electric Tramways changed hands a few days ago at 5s. The last business marked in La Plata Tramways was at 3d. a couple of months ago. There is a little business doing in Lisbon Electric Tramways ordinary, on the basis of 22s. 6d. xd. Shanghai Electrics are the fraction harder at 2 1/16.

Cables and Wireless.

Speculation continues to take an active interest in the "A" ordinary stock of Cables & Wireless. The price has been varying between 36 and 39, and on the week shows no quotable variation at 37½ middle. The "B" stock is somewhat neglected, and is regarded, under present conditions, as being little better than a gambling counter, with scant hopes of receiving a dividend distribution for some years to come. Sir Basil Blackett, as chairman of the Imperial and International Communications Company, addressed a private meeting at the House of Lords last week, in which he mentioned, amongst other things, that the company at present pays the various Governments some £600,000 a year. The British Post Office receives £250,000 per annum for beam rental. This, said Sir Basil, constituted a direct tax on the communications of the Empire.

Dollar Stocks.

Brazilian Tractions have been moving within comparatively narrow limits, and at 41 show a small fall. Power Corporation of Canada remain at 70; British Columbia Power "A" shares are a shade better at 38½ xd., the "B" at 18. Pennsylvania Water & Power at 73½, and Shawinigan at 67½ are unchanged on the week. Calgary Power are rather higher at 155. Hydro-Electrics strengthened to 40½, after being under 40, and International Holdings rallied, from 4⅛, to 5¼. American Telephone and Telegraph at 217½ shows a decline of 2½. International Telephone & Telegraphs at 45½ have gained the fraction. The company has made a successful bid for the undertaking of the Shanghai Mutual Telephone undertaking.

Home Railway Stocks.

Metropolitan consolidated stock has strengthened to 64½. Underground Electric income bonds, from 112, went back to 105, the fall being in accordance with warnings previously held out that there would be this drop as soon as the time had expired, as it did last Monday, for the exercise of the privilege to convert the bonds into shares. The price of the latter has risen 1s. to 24s. bid. The interim dividends of the Underground group are expected to be made public in the course of a few days, and, although some people profess to look for an improvement upon the 8 per cent. paid by the Underground Electric Railways for the whole of last year, there are others who consider that the board will adopt a cautious attitude, and be satisfied to repeat the 1929 distribution. It is expected that the interim dividends on the other stocks in this group will be the same as those declared a year ago. Amongst the traction issues, British Electric deferred ordinary is lower at 1,500 ex rights, and the preferred at 123½ xd is practically unchanged. In the Anglo-Argentine Tramways group, the first preference at 2½ xd are lower, for it is obvious that harmony does not prevail between the company and the Municipal Council in Buenos Aires. No changes of consequence have occurred in Mexican descriptions.

Miscellaneous Matters.

In the market for manufacturing and equipment shares, Siemens at 21s. 3d. show a florin decline, English Electric new ordinary are 2s. 3d. lower at 18s. 9d. and Electric Constructions have shed a few pence, to 12s. xd. Crompton Parkinson ordinary hardened to 25s. 9d. G.E.C. at 47s. 6d., allowing for the dividend-deduction, are better on balance. In iron, coal, and steel, Babcock & Wilcox went back to 55s., Vickers to 6s. 9d. Philips Lamps are back 1/16, to 58s. 9d. Hall's Telephone Accessories at 14s. 3d. have added 3d. to their price. Ericsson Telephones 7 per cent. preference remain at 20s. 9d. No alteration was made in the price of Telephone Rentals, at 3s., on the speech of the chairman at last week's meeting. Amongst cable shares, Great Northerns, now ex dividend, are quoted at 29s. In the wireless list, Canadian Marconis reverted to 20s. International Automatic Telephones are easier at 31s. 3d. The rubber share market enjoyed a moderate recovery, it being hoped that definite advantage to the industry will spring from the meetings now being held between British and Dutch rubber interests.

Share List of Electrical Companies.

HOME ELECTRICITY COMPANIES.

	Nom.	Approx. Dividend. 1928.	1929.	Price July 1 1930.	Rise or fall	Yield p.c.
	£					
Bournemouth and Poole	1	15	15	57/6	—	5 4 3
Brompton Ordinary	1	8½	8½	26/6	—	5 5 8
Charing Cross Ordinary	1	8½	8½	28/-	—	5 0 0
do. do. 4½% Pref. ...	1	4½	4½	18/-	—	5 0 0
Chelsea	1	8½	8½	26/6	—	5 5 8
City of London	1	10	10	33/9	+6d.	4 8 1
do. do. 6% Pref.... ...	1	6	6	28/-	—	5 4 4
Clyde Valley	1	8	8	38/3	—	4 3 9
County of London	1	7	10	45/9	—	4 7 4
do. do. 6% Pref.... ...	1	6	6	28/-xd	—	5 4 4
Edmundson's 7% Pref.	1	7	7	24/6	—	5 14 3
Elec. Supply Corporation	1	11	11	47/-xd	+1/-	4 13 7
Kensington Ordinary	1	8	8	27/6	—	5 1 10
Lancs. Light and Power	1	7½	7	24/6	—6d.	5 14 3
London Electric	1	8½	9	29/6	—	4 15 0
Metropolitan	1	9	10	40/-	+3d.	5 1 3
do. 4½% Pref.	1	4½	4½	17/-xd	—	5 6 0
Midland Counties	1	6½	7	27/-	—	5 3 8
Mid. Elec. Power	1	15	8	32/-	—	5 0 0
Newcastle-on-Tyne Ordinary ...	1	6	6	22/6	—	5 6 8
do. 7% Pref.	1	7	7	26/-	—	5 7 8
Notting Hill 6% Pref.	10	6	6	10½xd	+5/-	5 11 4
North Met. Elec. 6% Pref.... ...	1	6	6	22/6	—	5 5 9
St. James' and Pall Mall	1	8	8	28/-	—	5 0 0
Scottish Power	1	8	8	28/-	—	5 14 4
South London	1	8½	8½	27/6	—	5 1 10
Urban Ordinary	1	7	7	32/6	—	4 6 2
Westminster Ordinary	1	8½	8½	27/-	—	5 3 8
Whitehall Elec. Invst. 7½% Pref....	1	7½	7½	24/6	—	6 2 5
Yorkshire Elec.	1	8	8	31/3	—	5 2 3

HOME RAILS.

Central London Ord. Assented ...	Stock	4	4	77	—	5 4 0
Metropolitan	,,	3½	4	64½	+½	6 4 0
do. District	,,	4	5	77	—	6 10 9
Underground Electric	£1	7	8	24/-	+1/-	6 13 4
do. do. Income ...	Bonds	6	6	105xr	—6	5 14 3

TELEGRAPHS AND TELEPHONES

Anglo-Am. Tel. Pref.	Stock	6	8	109½	—	5 16 0
do. Def.	,,	1½	1½	24½	—	6 2 5
Automatic Telephone	1	10	12½	37/6	—	6 13 4
Cables & Wireless 5% Pref.... ...	Stock	—	5½	88½	—	6 4 4
do. A 7½ Ord.	,,	—	—	37½	—	... ...
do. B Ord.	,,	—	—	17½	—	... ...
Globe Tel. and T. Ord.	10	10	10	19	—	*5 5 3
do. do. Pref.	10	6	6	11½	—	5 9 1
Great Northern Tel.	10	20	20	29xd	—	6 18 0
Marconi-Marine	1	12½	15	1½	—	8 5 6
Oriental Telephone Ord.	1	12	12	55/-	—	*4 7 3

HOME AND FOREIGN TRAMS, &c.

Anglo-Arg. Trams First Pref. ...	5	5½	5½	2½xd	—⅛	11 0 0
do. do. 2nd Pref. ...	5	6	6	2⅞xd	—	19 6 2
do. do. 5% Deb. ...	Stock	5	5	67½	—1	7 8 0
British Electric Traction Def. Ord.	,,	5	5	1500	—25	... ...
do. do. Pref. Ord.	,,	8	8	123½xd	—	6 6 6
Brazil Traction	100	7	8	41	—½	4 17 7
Brit. Columbia Elec. Rly. Pcs. ...	Stock	5	5	99½	—	5 7 0
London & Sub. Trac. 5% Pref. ...	1	Nil	Nil	9/-	—6d.	... ...
London United Tram Deb. ...	Stock	4	4	50½xd	—	7 18 4
Mexico Trams, 5% Bonds ...	—	5	5	67½	—	7 8 2
Mexican Light Common	100	Nil	Nil	76½	—1	... ...
do. 7% Pref.	100	7	7	76½	—	9 3 0
do. 1st Bonds ...	—	5	5	81	—	6 5 0
Victoria Falls Ord.	1	15	15	3	—	5 0 0
Yorkshire (West Riding)		Nil	Nil	5/-	—	... ...

MANUFACTURING COMPANIES.

Assoc. Elec. Ord.	1	6	6	23/9	—	5 1 1
Babcock & Wilcox	1	13	15	55/-	—9d.	*5 9 1
British Aluminium Ord.	1	10	10	40/-	—	5 0 0
British Elec. Transformer Pref. ...	1	7	7	8/9	—	... ...
British Insulated Ord.	1	15	15	8½	—	4 0 0
Brush Ord.	Stock	10	10	120	—	8 6 8
Callenders	1	15	15	3⅞xd	—	4 4 0
do. 6% Pref.	1	6	6	23/9xd	+6d.	5 9 5
Crompton Parkinson Ord.	5/-	—	80	25/9	+9d.	5 16 6
do. 8% Pref.	1	8	8	26/-	—	6 8 0
Edison-Swan 1st. Pref.	1	7½	7½	24/6	—	7 1 2
do. 5% Deb.	Stock	5	5	84½xd	+2	5 18 4
Electric Construction	1	5½	5	12/-xd	—6d.	8 6 8
Enfield Cable Ord.	1	20	20	4½	—	4 14 1
English Electric	1	Nil	Nil	18/9	—2/3	... ...
do. do. Pref.	1	3	Nil	8/9	—	... ...
Gen. Elec. Pref.	1	6½	6½	23/6	—	5 10 7
do. Ord.	1	10	14	47/6xd	+1/-	5 18 0
Henley	1	25	30	6½	—	4 17 10
do. 4½% Pref.	5	4½	4½	4½	—	5 6 0
India-Rubber	1	Nil	Nil	8/9	—	... ...
Johnson & Phillips	1	10	10	14	—	5 6 8
Siemens Ord.	1	7½	7½	21/3	—2/-	7 1 2
Telegraph Construction	12	10	10	18½	—	*6 7 6

* Dividends paid free of Income Tax.

The Llandudno Conference.

Success Attends the fifth Annual Gathering of the E.C.A. and Allied Associations.

No. 2.*—*Concluding report of the proceedings with abstracts of the two papers and the discussions thereon.*

NO matter how well organised they may be, the success of summer conferences is almost solely dependent upon the weather. Apart from slight showers on the Friday, the weather at Llandudno was excellent. For that the President thanked the Chairman of the Urban District Council at the opening session of the Conference. The latter, however, modestly disclaimed the credit, passing it on to the town's Parliamentary representative, who happens to be Mr. Lloyd George.

The reception and dance on June 25th were enjoyable, although rather congested, and the proceedings continued until a very late hour. This did not prevent the members turning up in force for the business session the next morning, when after the annual meeting there was a civic welcome, and Mr. Willoughby-Ellis delivered his presidential address (*vide* our last issue). The Chairman of the Llandudno U.D.C. (Councillor W. S. Williams, J.P.) mentioned that Llandudno was one of the places in which the municipal assisted-wiring work was given to the local contractors, who served them well. The Association's watchword was "Co-operation"; the motto of his Council was "Live and let live." The morning's business concluded with the presentation of a silver salver and cheque to the Secretary, Mr. L. C. Penwill, as a mark of the Association's esteem and appreciation on the occasion of his marriage. In making the presentation, Mr. Willoughby-Ellis said that Mr. Penwill succeeded, in 1926, the late Mr. L. G. Tate, who, as our readers will remember, rendered such splendid service in the contractors' cause for many years. Since 1926 the membership had grown by 30 per cent., while the work had increased in even greater proportion.

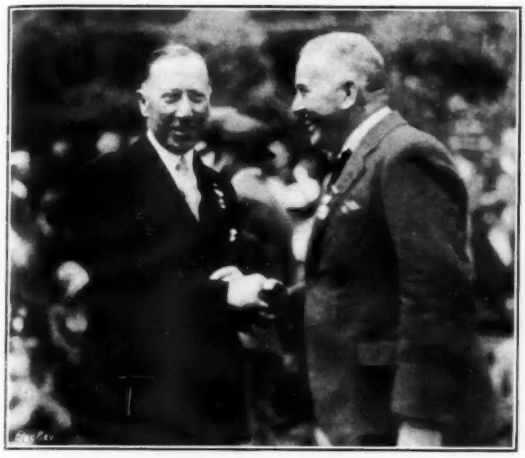
The business of Thursday afternoon was the reading of his paper upon "The Future of Electrical Contracting" by Mr. C. H. Flower; we reproduce this in abstract form on a later page. The paper gave rise to a lively discussion, in which Mr. Flower's views on the subject of municipal competition were questioned. Delegates from the Midlands maintained that so far from lessening, the competition of municipal supply authorities was becoming more intense. Other speakers, however, agreed with Mr. Flower that the business went to those who sought for it. Both Mr. Shaw and Mr. Sully considered that the local E.D.A. Circles provided a means of co-operation between various electrical interests which were not adequately supported and encouraged. It was generally believed that national co-operation could not be brought about until a measure of agreement was first reached in the various districts. Mr. Grierson, in an effective contribution, called upon his fellow contractors to think more and to go out for business. He drew particular attention to the colossal field which existed for electric heating, but dismissed the thermal-storage system as expensive and space-wasting. Mr. Povey said that not only should contractors combine to organise showrooms, but also to form a co-operative buying organisation—or even, if manufacturers were unreasonable, commence manufacturing appliances. Mr. Flower thought that this was going a little too far. The author also persisted in maintaining that the future of the industry lay in the contractors' own hands. For further points we refer the reader to our report of the discussion.

On Thursday evening a smoking concert was held at the Grand Hotel, followed by a dance, which again kept

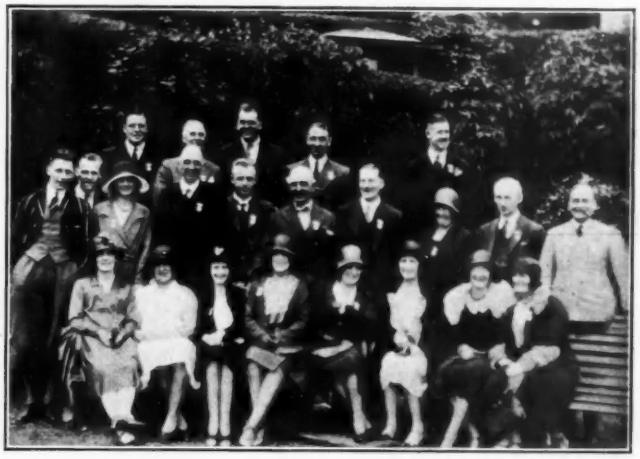
Councillor W. S. Williams (Chairman of the Llandudno U.D.C.) Welcoming the Delegates in the Town Hall.

* No. 1 report appeared last week.

Some Llandudno Photographs.



Past and Present Presidents.



Sheffield and Chesterfield Delegates.

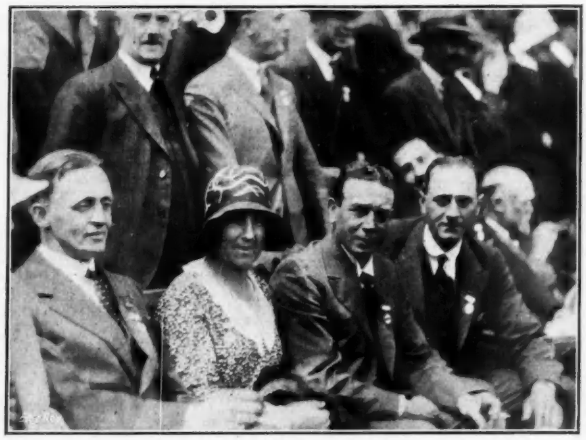
Mr. W. Cross.

Mr. and Mrs. L. C. Penwill.

Messrs. A. Shelton and G. J. Berry.

Before—

—and After a Session.

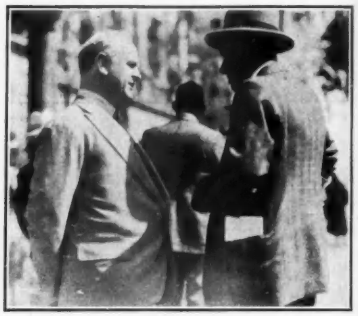


Sitting for the Official Photograph.

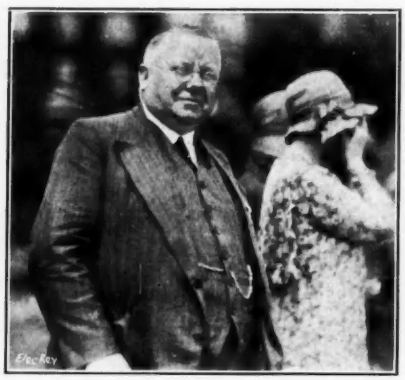
The Council after their Meeting.

The Centre of the " Official " Group.

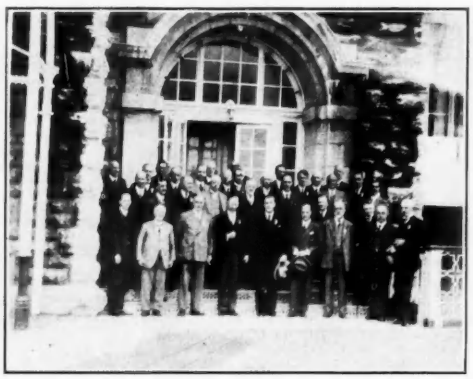
Mr. and Mrs. W. A. Shaw.



Mr. E. E. Sharp, of Venner's.



Mr. " Bobby " Smith.

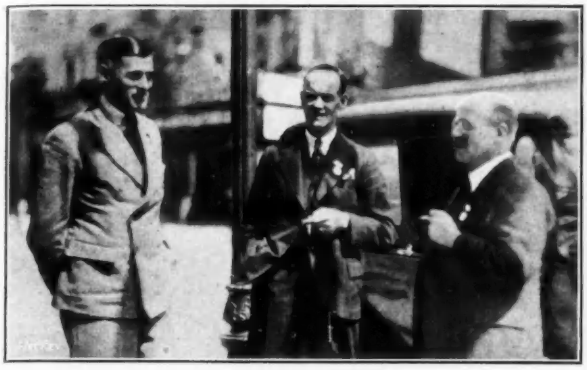


Members of the Council.

Mr. F. Samuel.

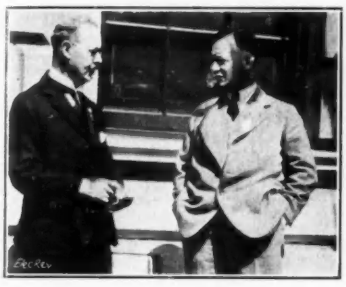
Panora, Ltd.]

Members of the E.C.A. and Allied Associations and—

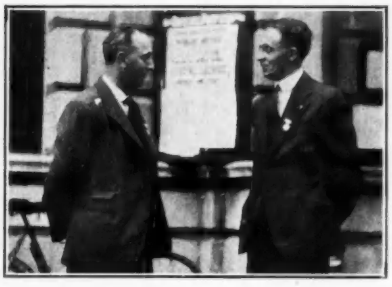


Mr. W. F. Roberts and Colleagues.

Messrs. H. Browne, H. Bailey, and A. F. Bannister.

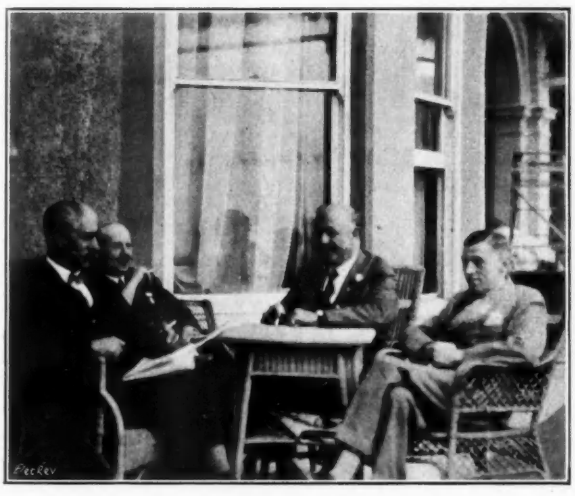


Messrs. W. H. H. Hyde and R. Barron.



Messrs. E. N. Kidd and A. G. Bruty.

Messrs. T. R. Martin and H. Marryat.



Messrs. H. A. Pryor, C. E. Lark, E. A. Marx, and H. W. Albrow.

Assembling to hear Mr. Cross's Paper.

—Visitors Assembled at Llandudno, June 26th, 1930.

[London.

"To-morrow will be Friday" (Mr. F. Madge).

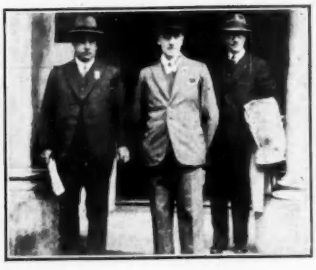
Mr. J. Snow Huddleston Collects for Charity.

"Joie de Vivre."

Messrs. W. Riggs, W. H. Walton, and R. Grierson.

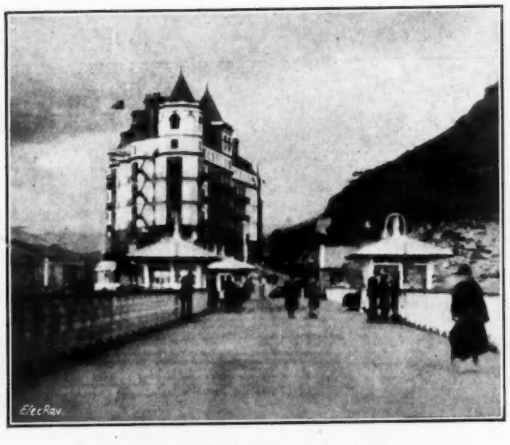
Mrs. Rogers, Mrs. Kirkby, and the President.

An Extra-mural Discussion.

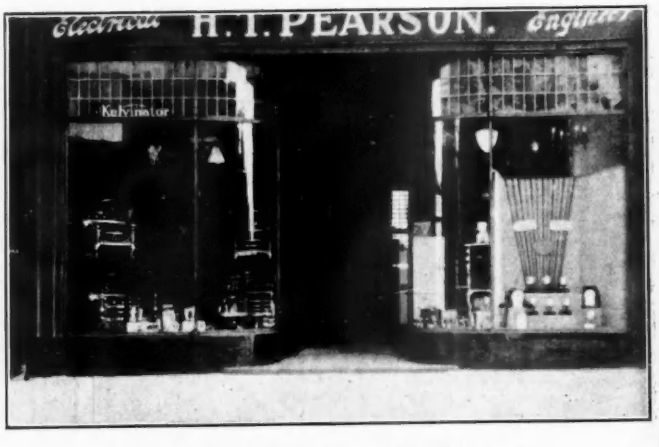


Messrs. J. G. Barnett, A. Gould, and C. W. Caswell.

The New President, Mr. H. C. Hazel.



The Grand Hotel from the Pier.



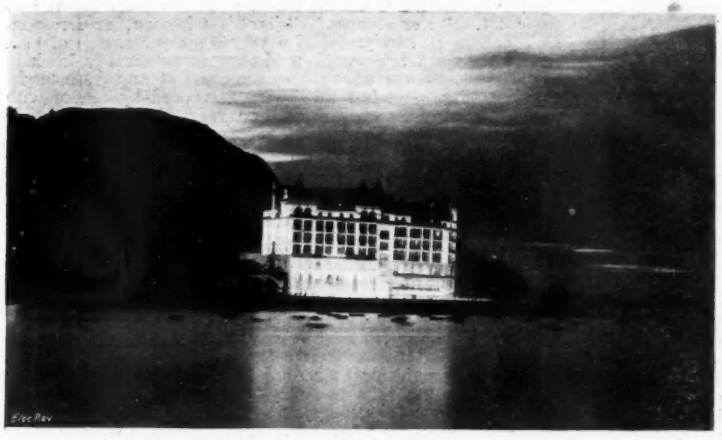
Mr. H. T. Pearson's Establishment.

Messrs. G. Glover & Co.'s Windows.

Making Friends with the Seagulls.

the visitors up very late. The effect of this was observable in the Town Hall on the following (Friday) morning, when it was found necessary to give half-an-hour's grace.

The session was opened by a paper on "Specifications and their Problems" by Mr. W. Cross, who maintained



Night View of the Grand Hotel, Llandudno.

that the serious disparity shown in the prices of various tenderers for the same work was in many cases due to differing interpretations of specifications. Where the work was clearly specified, the quotations of established firms would not vary by more than five per cent. The author maintained that the evasion of the conditions of a tender should be discountenanced as unfair competition, although he said that such evasions had sometimes been condoned by consultants. He warned contractors of the danger of agreeing, as a condition of receiving a contract, to submit to the unregulated requirements of any one individual. The confusion which arose in the specification of cables and wires was mentioned, and the author urged that all fittings, shades, &c., should be carefully defined. He wisely said that when ordering plant, switchgear, &c., he generally preferred to specify the required performance, leaving the design to the works staff, who knew the cheapest way to get the desired result. Manufacturers would be thankful, we are sure, if all their clients were as reasonable!

In opening the discussion, Mr. Lightfoot, referring to prime cost sums, showed how much better things were arranged in the plumbing and building trades. Mr. F. W. Cook thought that the prime cost question could be solved very simply, and also expressed the view that contractors would find it of ultimate advantage to go a little beyond the strict letter of their contracts. Mr. E. S. New suggested that it might be found cheaper to retain the batteries of private plants if they were put upon supply authorities' lines at special rates. Maintaining that delays should be paid for, Mr. W. R. Rawlings averred that he had had a certain job running for seven years owing to building delays; as the work was on a time and material basis, he was not unduly worried about it. Mr. R. Grierson took the author to task on several points, and said, incidentally, that everybody thought that he (or she) was capable of preparing specifications. This matter had already been touched upon by Mr. Rawlings, who amused the meeting by quoting a really complete (if involved) specification for the wiring and switching of a room prepared by a lady client. Mr. Lang pointed out that the mere initials "C.M.A." did not protect the purchaser, who should insist on cables made by a member of the C.M.A. On the subject of the risks to which contractors were exposed, Mr. Marryat said that a fire accidentally caused by a contractor's employé while on a small job led to the destruction of a building, damages of £25,000 being awarded against the contractor.

In the course of his reply, Mr. Cross said that the Association was considering the extension of the scope of its third-party insurance scheme. He considered that the customer should always be humoured, even if he was in the wrong. He did not think that the private plant should be too hastily scrapped in favour of a public battery-charging supply, and he maintained that a quantity surveyor was not necessary if specifications were properly prepared.

The President then proposed votes of thanks to the Llandudno U.D.C., Mr. E. S. Lance (who was responsible for the local arrangements), Mr. Penwill, the authors of the papers, and to all who had contributed to the success of the Conference. In a felicitous speech, he then installed his successor in the office of President, Mr. H. C. Hazel, who, he said, had served the Association faithfully and well for many years. Mr. Hazel briefly thanked the members for the honour accorded him, and said that as a provincial President he would have to rely a good deal upon his London colleagues. To the latter a very considerable measure of the Association's success was due.

The proceedings concluded with a vote of thanks to the retiring President for his valuable services during his year of office.

Although threatened by showers, the garden party arranged for Friday afternoon was duly held. The Happy Valley provided a charming place for the purpose, and the function was very enjoyable. The last function was a ball and supper at the Grand Hotel.

With these notes we reproduce a few photographs taken during the Conference, in which readers will recognise many old friends.

One of the illustrations on this page is a night view of the Grand Hotel, Llandudno, taken specially for us from the Esplanade. G.E.C. equipment was employed to secure the excellent result, there being ten floodlighting units each equipped with a 1,000-W "Osram" lamp.

The President's Reception.

In the following pages we print abstracts of the two papers and report the discussions.

The Future of Electrical Contracting.

Abstract of a paper read by

C. H. Flower, A.M.I.E.E.

(Vice-Chairman E.C.A. Southern Section).

After referring to the wide scope afforded by his subject, the author said that it might be claimed at the very outset that the future of electrical contracting was unrivalled by any other comparable trade. But the question was whether the public would turn for their electrical work and appliances in the main to electrical contractors, or to supply authorities and electrical manufacturers. Since the Act of 1926, a large number of municipalities had opened showrooms—some for demonstration purposes only and some for actual sales. Very few indeed had established installation departments, although throughout the whole country many assisted wiring schemes had been inaugurated, the actual work being sub-let to local contractors. The Act made potential competitors of the municipal authorities, but it was, in part, the outcome of negotiation and agreement amongst municipal engineers, manufacturers and contractors. Municipal engineers felt that no potential consumer should be neglected because he could not pay cash in full for an installation. They had to ask, therefore, for the powers which the Act gave them; but Mr. Alger, who represented the contractors, would tell them that it was not intended that those installation powers should be utilised directly by the municipalities so long as contractors were able and willing to carry out the work efficiently and economically. He would say, therefore, that from municipal engineers they need expect very little direct competition, and that the more enterprising they were in the matter of assisted wiring schemes, the more grist would come to the contractors' mills. Supply companies, however, had always had power to sell appliances and installations. Many of them had not used the powers, but others were developing them with increasing energy. No contractors would fall out with them over their desire to boost the sale of electricity. But contractors might, however, differ from them, and with very good reason, if they believed that an installation department of their own was, in the long run, going to be a wise means to the end in view. The profit which even a large and successful installation department could bring them would represent a relatively small addition to their other earnings. Since every job done by a contractor was a source of permanent revenue to the supply company, he should be regarded as an ally who had done invaluable work in the past and was indispensable for the future. Such being the case, one must assume that showrooms and installation departments were an expression of the companies' opinion that, at least in some districts, such service offered difficulties which contractors could not satisfactorily overcome. Why should they not, then, devote the time and thought, not to say money, required to develop an installation department or chain of installation departments, to the development of closer collaboration with electrical contractors in the area? Let the supply company instruct resident engineers to use E.D.A. circles and E.C.A. branches to meet and confer with contractors in order to exchange information as to where load was wanted or where prospective consumers existed, and they would find it would cost them less than competition and would tend to swell the spoils of victory for all.

With regard to the manufacturers: he was sure that they had no wish to sell such of their products as conduit, cables, switches, and other accessories, to the user as a completed installation. Contractors accounted for too important a part of their turnover for them to wish to antagonise them by direct competition. It was true that they sometimes did so, but when they took an order for a complete installation they always, so far as the author knew, sub-let the wiring to a contractor. A different state of affairs existed when lighting fittings were considered. The contractors' attitude towards manufacturers was that they should be content to manufacture and sell to the contractors, leaving members of the trade to retail to the public. Clearly, however, if they were to attain that object, they must convince the manufacturers that they could dispose of their products through contractors as effectively as by any other means. If the sale of practically all fittings was to be effected through contractors, they must educate the public to regard them as the principal salesmen. That they could do only by showrooms, by canvassing, and by advertising. Many contractors fulfilled those requirements, adequately and well, but, as a trade, they certainly did not. Would it not be worth while for those who had no showroom to consider the possibility of co-operating with neighbours in a like state to form one? Suppose three or four contractors combined to form a committee of management, to share the necessary capital, to share the profits, to put their own fittings business through the showroom, and to find an equitable basis on which to share the jobbing work and inquiries coming into the showroom. Might not this provide an example of rationalisation with a good prospect of success?

Next came canvassing: he was thinking of the canvassing which the manufacturers did at present—not canvassing for installation contracts. Why should not a co-operative showroom have a canvasser or staff of canvassers of its own? Advertising would not present much difficulty because the manufacturers and E.D.A. were so generous with overprinted leaflets and catalogues.

Larger trades than theirs had recently found the necessity of co-operation in order to reduce the costs of retailing. If they could follow that lead, they should, in a year or two, have a chain of contractors' showrooms throughout the country which would really become the local centre for everything electrical to which everyone would turn. There was one other factor in the proper regulation of fittings sales which they must not lose sight of, and that was the "Trade Register," which Mr. Walton foreshadowed at last year's conference.

The author then considered how electrical contractors could share among themselves, and with profit, the very large volume of installation work which would undoubtedly fall to their lot. "Kerbstoners," "jerry" wiremen, or irresponsible one-man firms produced a very large percentage of bad, not to say dangerous, work, and they represented bedrock in price levels. Those whose work was bad at any price might not last very long, but they were succeeded by others with the same ideals. They would be reduced to a negligible quantity only by some scheme of compulsory regulations with or without inspection. A good deal of discussion had centred lately round that subject, but the measure of general agreement so far obtained did not seem to go much beyond a simple expression of opinion that "something" ought to be done to render domestic installations as safe as factory installations, but that that "something" must not be of an alarmist nature. Assuming that a satisfactory set of compulsory rules was desirable, and could be drawn up, there remained the question of how to enforce respect for them. They must, he thought, rule out the possibility of supply authorities undertaking such a responsibility; it would be too serious and too expensive for them for one thing, and, for another, would meet with great opposition from many contractors. It might be possible to devise a scheme which would combine a signed guarantee by the contractors with a staff of Government inspectors. The guarantee would declare that the work which the supply authority was asked to connect complied with the rules, and would be deposited with the supply company before it would connect. The supply company would make a weekly return to an area official appointed by the Commissioners of new connections made by them. That official would arrange for the inspection of a certain percentage of those new connections at as early a date as possible. Not every installation could be inspected, but contractors would know that any one might be so examined and there would be serious penalties for infringement of the rules. He considered that the matter was important enough to warrant the appointment by the E.C.A. Council of a special committee to consider it.

Mr. Flower then considered the future of what he described as "reputable contractors." In the ELECTRICAL REVIEW of April 18th, Mr. Taunton drew a vivid picture of their present state. His points were that too many people were allowed to tender for contracts; that each one knew that a fair price based on costs, plus overheads, plus profits, stood little or no chance of being the lowest; that the price thus estimated merely served as a yard-stick by which each endeavoured to gauge the limit of the gamble required to underbid the others; and that when the job was completed and the account had been rendered, there was often an unseemly wrangle over "extras." As Mr. Taunton said, all this meant that in the end no one was happy. Nor did he see any cure for that state of things. "Megohm," in the *Electrical Times*, recently made reference to the wave of pessimism which appeared to have invaded the industry and various causes were suggested. The real cause, however, to judge by the note, would appear to be that hundreds of electrical contractors sat in their offices waiting for work to come to them, while the supply companies, builders, and ironmongers acquired the business. Yet he had often been told by clients, and had good reason to believe that it was true, that of all sub-contractors, the electrical was the most persistent canvasser. He suspected, however, that when the writer spoke about canvassing he was not thinking only of canvassing for installations in new buildings, and the author had already said something of the importance of their developing their activities as retailers. He would like to direct attention to the possibilities of canvassing for, perhaps, less obvious work such as maintenance, shop-window lighting, electric sign work, and the re-organisation of existing lighting in small workshops and factories.

If times were bad, it was not primarily due to shortage of work nor to the incompetence of contractors, but to the fact that prices were bad, and prices were bad because of that bugbear known as "free competition." That would be an ideal state of affairs in an ideally-constituted state, but in our very imperfect world, everyone who could confine competition within decent limits did so. Architects, consulting engineers, station engineers, trade unions, had all done it. The most successful manufacturers such as the cable makers, lamp makers, and petrol companies knew the advantage of controlled competition. Absolutely free competition existed in some prosperous trades, but in such cases it would generally be found that something was sold about which the buyer was able to form his own opinion. But how many buyers could form an opinion of the merits of an electrical installation?

He knew that price control would be resented and resisted by their clients, even though they practised it in their own business or profession, but once that end was attained they would still find them fighting as hard as ever for their work, but the contractors would know (and their clients should be glad to know) that they were making a reasonable profit from it. If he was right in thinking that this was the contractors' greatest problem, he was sure that he was right in believing that if it was thought over and talked over in branch meetings and district meetings, a solution would eventually be found.

Discussion.

Mr. J. Orringe (past-president) said he was convinced that it was in the interest of consumers that electrical contractors, members of the E.C.A., should be entrusted with installation contracts, but the problem was how to secure that work under present conditions. Although he was glad to acknowledge the co-operation that existed between many municipalities and the members of the E.C.A., it was still found that in many centres unreasonable demands were put forward and these jeopardised the interests of the electrical contractor. Power companies had the fullest possible powers yet did not manifest a desire to co-operate with contractors. In his own area where contractors had their own canvassers, a problem over tariffs sometimes cropped up and it became necessary to consult the engineer of the power authority. It was almost certain that two or three days later one of the manufacturers' representatives would call on the contractor's customer and try to obtain an order from him. The contractor also had to face the competition of large stores which sold appliances. These bought supplies in large quantities but when sales were made over the counter, their responsibility ceased. When contractors supplied the goods, their responsibility continued; they had to give service which was not always properly remunerated. There was room for thought in the suggestion that contractors should band themselves together for the purpose of opening a joint showroom in localities where one was needed, but many of them, owing to the high expense attached to running suitable premises, hesitated, even if they were able to put the money down, while they were encountering direct and indirect competition from other sections of the industry. As contractors they wanted to increase their turnover, also the manufacturers' turnover, but they must receive a reasonable remuneration for the heavy overhead expenses to which they would be committed if they embarked on the opening of showrooms.

Mr. W. A. Shaw (past-president) said that if anyone asked a contractor in any part of Manchester and district what he thought of the future of electrical contracting, he would probably get the answer:—"It's like the cotton trade, it has no future." Competition from the municipalities in some parts of the country was so intense that contractors had had to go out of business. All sides should remember that the electrical contractor had helped very largely to build up the industry to the position it was in to-day. In view of the fact that alternating current was being universally adopted in this country, it seemed to him more imperative than ever that the contractor who undertook the wiring of premises should be made to feel his responsibility. There was need for a national code of rules and mention had been made of the "jerry-contractor"; there was also the jerry-builder. The speculative builder in many parts of the country employed others to put in the lighting, and often they used inferior material and put in as few lights as possible. If contractors had to sign a guarantee when the installation was completed, it would make them feel their responsibility, because if the terms of it were not fulfilled and prosecutions resulted the effect would be salutary. Some form of price control was also needed.

Mr. H. G. Hall (Sheffield) said that the E.C.A. Council should watch very carefully developments arising from corporations opening their own departments under the 1926 Act. Personally, he thought that Clause 48 was the biggest disaster that had ever happened to contractors or the electrical industry. In Sheffield they were up against competition that made it impossible for any contractor, except a "kerbstoner" to get a living. If the price of £5 7s. 6d. was given for a job, someone else would came along and say "We will do it for £5." If he went to the Sheffield Corporation about mains for a power and lighting installation, although they were not asked to quote and were not supposed to know the details of the job, it would come about that an interview would follow with the foreman of the works, and in due course the customer would receive an uninvited tender from the Corporation. Power authorities in some areas said: "If you don't give us the order for the installation we will not give you a supply of current." Corporation officials in other places issued a schedule of materials, the contract being let on terms which provided for the materials being bought from the corporation. He doubted whether that was legal.

Mr. R. Povey (Manchester) contended that owing to the growth of competition, contractors would have to fight, and fight quickly. The 1926 Act had certainly been a catastrophe from the electrical contractors' standpoint. The contractors in one town were threatened that if they did not buy their mains material from the corporation, the latter would enter the contracting business. There was not a showroom in the country that could be proved to be a business proposition. The simple hire of cooking and heating apparatus could not possibly pay, because the maintenance must be colossal. Hire-purchase might be self-supporting, but municipal showrooms were at the root of the contractor's troubles. Years ago, he had suggested that contractors should amalgamate and have their own showrooms and perhaps set up a buying organisation, or even take up manufacturing if manufacturers were unreasonable. The fight against municipal competition would have to go on.

Mr. R. Grierson, referring to the title of the paper, said that the logical name of the Association was the "Association of Electrical Installation Engineers." He considered that the pessimism which had been expressed was due to the fact that the work went to the man who gave the best value. They should not aim at tying up the hands of their competitors but at securing even terms and a clear course. Contractors had to realise that to be successful they must give or produce something better than their competitors. He had found that when a supply authority had an installation department of its own it was most difficult to secure necessary information. Suppliers of electricity should stick to their own job and leave installation work to the contractors. One handicap to development which should be removed was the high price which some authorities asked for mains and service connections. He objected to the use of the term "fittings" as applied to electricity-consuming apparatus; the term might cover motors, heaters, cookers or anything else. The speaker then dealt with the multifarious matters in which the electrical installation engineer was supposed to be a specialist—from flood-lighting to battery maintenance. He thought that installation businesses which could not employ experts for each branch should combine and form departments for each class of work. As an example of the enormous amount of work which awaited the electrical contractor, he instanced the colossal heating field. The old thermal comparison was now dead; people considered other things besides this. He had found that with an energy price of ¾d. per kWh, less 10 per cent., he could heat a house with rooms of 3,000 cu. ft. capacity for 5½d. per room per day. There was a big field for the thermostatically-controlled heating system. Thermal storage was costly and took up too much space. The heat-storing properties of walls, curtains, &c., were quite sufficient; the temperature fall in the ordinary modern room was only 1 or 1½ deg. per hour. This permitted the use of energy during off-peak hours only, employing time switches for the purpose. The fact remained that cheap electricity was the life-blood of the industry. If supply authorities would have the courage to introduce a rate between ¾d. and ¾d. per kWh they would be adequately rewarded. The amount of apparatus in use would increase with a resultant improvement in the diversity factor.

Mr. W. Cross (past-president) did not think the contractors had so much to fear from the municipalities' installation work as from their sale of appliances—the "cream of the business." It was suggested that manufacturers were giving discounts to people who were not entitled to them, but if the contractor took a little trouble he could obtain orders for fittings. In any event those fittings were rarely ready for immediate erection, and if the contractor did not get the discount he could charge for fixing them. Fears had been expressed regarding the alleged dangers of the use of 230 V a.c. In his opinion there was as much to be feared from low-voltage d.c. installations if the work was not properly done. All installations should be capable of standing up to 230 V a.c. He did not agree that the contractor had to be an *expert* in many branches of work. Contractors must constantly educate themselves—by carefully reading the technical Press and studying new catalogues—and they must be able to give good advice to consumers. They should take an interest in every job and take customers to showrooms, instead of letting them go where they wanted. Then they would find that business was not so bad as had been suggested.

Mr. R. Tweedy-Smith (hon. solicitor) dealt with the legal aspect of one or two points raised in the paper. He reminded the members that under the 1926 Act municipalities were compelled to keep separate accounts for their installation departments and showrooms. He suggested that, as ratepayers, individual contractors should inquire of their municipal accountants if such separate accounts were kept and if so ask for a copy. If they were not being kept the local government auditor should be acquainted of the fact. A good many municipal supply authorities forced consumers to sign an agreement by which they undertook to conform to all the regulations of the department. The Acts only laid down six stipulations and if these were fulfilled the undertaking was bound to give a supply, failing which a summons could be taken out against it.

Mr. W. R. Rawlings (past-president) said that once upon a time the contractors were always fighting—among themselves and with others. That condition of affairs was disappearing in the face of the necessity for concentrating on the common object—the satisfaction of the consumers' requirements. It was wrong of supply undertakings to dabble in the wiring business, and, moreover, their work was too often very unsatisfactory. As there was no method of inspection this could not be combated but he did not feel comfortable regarding Government inspectors, as suggested in the paper. In his Faraday Lecture Mr. Ll. B. Atkinson showed how electricity had changed human environment in the last fifty years. His words proved that there was an enormous amount of work to be done; the contractor must go out and do it.

Mr. C. W. Sully (E.L.M.A.) suggested that the paper answered its own question regarding price control by advocating co-operation. He had attended the recent I.M.E.A. Convention where similar questions were discussed; he regretted that the two bodies had not met together at the same time. National co-operation could only be achieved by preliminary local co-operation. Of the local Circles formed during the E.D.A.-E.L.M.A. Campaign only about half remained. The Circles could do admirable work. He recalled one with a membership of 60 which held well-attended monthly meetings with remarkable success. The E.C.A. should do all in its power to encourage local Circles. Many of the difficulties arose from the absence of contact.

In his reply, **Mr. Flower** said that he was still convinced that local co-operation was the only cure for the industry's difficulties. He thought that the competition of the large stores, aided by large-scale buying could be met by the combination of contractors; after all, the stores' electrical departments were not usually large concerns. With regard to service: other industries had made it pay its way, why should not contractors do the same? Although large sums were needed for showrooms the amount for each contractor need not be very high. The activities of certain municipalities mentioned by Mr. Hall were not due to the operation of the 1926 Act; they had secured their powers prior to the Act. Although he did not agree with municipalities requiring contractors to purchase materials from them he believed that the materials were generally supplied on favourable terms. Mr. Povey's suggestion regarding co-operative buying was a good one, but he thought that co-operative manufacturing was going too far. Mr. Grierson had said that all contractors wanted was a clear course; he (the author) agreed but still considered that some form of price control was also necessary. Within limits Government inspection of installations would be a good thing; he did not know of a suitable alternative.

Specifications and their Problems.

(Abstract of a paper read by

W. Cross, M.I.E.E.,

Past-President).

Introducing his subject, the author said that a good specification should state clearly the details and quality of the work required, and the conditions under which it would be carried out and paid for. In many cases the highest price quoted for a job had been four times greater (or even more) than the lowest price. That was sometimes due to an exceptionally high price being quoted by someone who did not want the particular work, and to the lowest tenderer having little experience in the class of work called for, or believing that he could put in inferior work. In many cases, however, uneven prices were due to specifications which could be read in different ways. If the specification was clear, not more than 5 per cent. would separate the highest and the lowest quotations by established firms. Some contractors said that they preferred a vague specification, as they could quote a low price, and then use material inferior to that desired (but not specified) by the customer or his agent, or make a big profit on extras which were not mentioned in the specification. Such vague specifications were bad for all concerned. In fairness to competitors, the terms of the specification should be observed by the successful contractor. The author had heard of persons acting as consulting engineers who had passed inferior material and work because the contractor had quoted a low price for which he said he could not carry out work to the specification with profit. It was not just to permit such conduct, as it enabled the contractor to make an unfair profit, or reduced loss, at the expense of the customer and of his fellow contractors.

A specification contained general conditions, a schedule of the work required and a specification of the quality of materials and work. General conditions should state for whom the work is to be carried out and, under whose supervision; terms of payment; time of completion; maintenance and guarantee required; for what insurance the contractor was to be liable; who would cut holes, chases, &c., and make good; whether plans and schedules were required on completion; definition of "prime cost," &c. It was imperative that the contractor should know for whom he was working, and who would pay, and terms of payment were of great importance. When time of completion was mentioned it should, in fairness to the contractor, be observed by the customer. It was more expensive to carry out work slowly, waiting for other trades, &c., than to work without stop from the start to the finish of the job. Insurance against various risks incidental to carrying out electrical installations was called for in most specifications. Practically all firms insured against claims under the Workmen's Compensation Acts, but few knew how great their liability might be to third parties for damage to persons or goods. The E.C.A. had arranged for a policy to cover that risk to a large extent, but it seemed impossible to cover absolutely every conceivable risk. A fire policy covering all work in progress could be obtained for a small premium and the author recommended all contractors to take out such a policy.

The definition of the term "prime cost" should be given in every specification. It sometimes meant the list price, and sometimes the price actually paid for material by the contractor, all trade and cash discounts and rebates being deducted. He recommended the general adoption of the R.I.B.A. definition of "prime cost" which was:—"The words prime cost or the initials p.c. applied in the specification to goods to be obtained and fixed by the contractor, shall mean, unless otherwise stated in the specification, the sum paid to the merchant after deducting all trade discount for such goods in the ordinary course of delivery, but not deducting discount for cash, and such sum shall be exclusive of special carriage, the cost of fixing and contractor's profit."

The question of variation of p.c. sums arose in many cases, and apparently architects and consulting engineers had no fixed rule. The percentage added by the contractor for profit did not depend altogether on the value of the material, for the cost of handling a fitting valued at £100 was not necessarily greater than the cost of handling a fitting of £50 value, and might, in fact, be less; so that if the percentage was added to the difference and the p.c. was less, the contractor would be out of pocket. If the p.c. sum should be exceeded, the percentage added to the original sum should be added to the extra, but only the net amount should be deducted if the p.c. sum was less that that given in the specification.

A clause was usually inserted to the effect that the work should conform to the I.E.E. "Regulations for the Electrical Equipment of Buildings"; to Factory Act Regulations, if applicable; to the requirements of the supply authority; and to the satisfaction of the architect or consulting engineer, without any reference to arbitration in case of dispute. Contractors accepted a great risk when they agreed to such a clause. Legally the individual named might require the contractor to do almost anything, no matter how unreasonable. Most of the bigger architects and consulting engineers, however, used the term "reasonable satisfaction" and inserted an arbitration clause. The maintenance and guarantee clause might operate unfairly to the contractor if the actual time of completion of the whole contract was delayed and he suggested that the maintenance period should commence at the time any section was completed or used by the customer.

The guarantee clause usually followed building rather than engineering practice, so that if a fault occurred, it was more costly to put right than if only a spare part had to be replaced at the works. Fortunately, however, electrical work seldom seemed to entail heavy expense to the contractor under the guarantee clause. The specification should state the system of supply if electricity was taken from the public mains together with information as to the position of the service terminals, and who would pay any service charges. If private plant was to be installed, full details of the materials and work required should be given. So far as possible, the quality of material should be specified, without reference to any named manufacturer, though that was sometimes difficult.

The specification of cable was seldom accurate. As a rule, it was intended to use a cable manufactured by a member of the C.M.A., but, unfortunately, the wording in many cases was such that any make of cable could be used. For instance, the term "C.M.A. 600-megohm grade cable," was often used, which only stated that cable should be of the same quality as C.M.A. cable, instead of the term "C.M.A. cable, 600-megohm grade." "Maconite," "Lecite," "Dualite," or other cables of that class, were being increasingly used, but at present it was difficult to specify them without using a trade name. It would be useful if a term for all cables of the class could be found. The size of all cables and wires should be specified if correct tendering was to be obtained, as otherwise the smallest size possible to conform to I.E.E. Rules might be used without taking into account future extensions.

The methods of protecting the cables and selecting the runs were of importance. A screwed tubing job without boxes at the outlets and run on the surface was a much cheaper job than one with proper boxes at all outlets and concealed in walls and ceilings; and wiring run by the shortest route in sight was less costly than wiring fixed so as to disfigure the building as little as possible. The arrangements for switching and fusing should be carefully defined, giving the size, number, and position of main switch-fuses, distribution boards, &c. Spare ways on distribution boards were very useful for extensions, but if the number of ways was not specified, one could not afford to provide these. The type of fuse and enclosure should always be specified, as the cost of these items could appreciably affect the total tender. It was very difficult to specify the quality of branch switches without mentioning manufacturers' names, and in all cases the method of fixing should be mentioned, whether surface, sunk in iron boxes, or sunk in wood boxes, as well as the finish of covers or switchplates. All sockets and plugs should be to B.E.S.A. standard dimensions, and the quality of installations would be improved if earthing pins were provided in all cases.

Fittings, shades and lamps should be carefully defined. If they had been selected, it was fairer to the contractor to give the maker's description as he might then obtain special prices from the makers. As a rule, it was intended that blocks, flexible cord, &c., should be added to the prime cost allowed for fittings, as few makers supplied them ready wired, but that item was often omitted from the specification. Generally, the author preferred to specify the required performance of plant, switchgear, &c., leaving the design to the works staff, who knew the cheapest way to get the desired result.

The E.C.A. Conditions of Contract included some useful clauses which could well be included in many specifications. He referred specially to those dealing with accommodation or travelling allowance for employés working away from home; labour during ordinary working hours for the erection of plant, machinery and wiring as specified, and for completing the contract in a workmanlike manner; the non-provision of lubricants, fuel oil, or current for temporary lighting or testing for other trades; and the necessity for adequate facilities for the economic execution of the contract, the free use of a lock-up stores and such ladders or scaffolding as might be erected.

A schedule of lights, switches, sockets, &c., should be provided as well as information from which the length and size of mains could be calculated easily.

When a client was not prepared to pay a consulting engineer's fee for a specification, one contractor might prepare a scheme, and competitive tenders from similar firms should

be obtained (if desired) on that scheme. The job would probably be more efficient than with competitive schemes, the tendering would be closer, and as each contractor would prepare schemes for different owners, the cost of preparing schemes and estimates would actually be less than the cost of preparing competitive schemes, even if the owner did not pay a small fee for the work involved.

If a good specification was drawn up and firms of similar standing were invited to tender for the work, it might be expected that the various prices quoted would only vary to a small amount. As a rule, the one whose tender was lowest would receive the order, though at times it would be advantageous to the owner to spend a little more in order to get special advice on some technical matter in which the firm concerned was expert, or to recompense the firm which prepared the scheme. If, however, public tenders were invited, it was often good policy to place the order with a firm quoting the average price for the job, as the one whose price was lowest might not be competent to carry out the work efficiently without a large amount of supervision.

Discussion.

The discussion on the paper covered a wide range, and was led by **Mr. Lightfoot,** who disagreed with the assertion that on a clear specification the prices quoted by established and reputable firms would vary only slightly. One of the biggest bugbears which they had all to face was the manufacturer who specified the use of his own materials. Even if the contractor who drew up the specification did not get the job, he at least would have a good client, though he would not dare to refuse to supply a second or even 50 specifications if an architect asked for them. Fire risk was a matter that required very careful watching. In one installation which he had handled he was asked to take out a policy not only for his own work, but for other people's as well. Contractors should know how far they were liable. With regard to prime cost, it should be made quite clear that the p.c. sum was net. Compared with other trades, they as contractors were mere infants. No plumber would fix his apparatus unless assured of his reserved discount, which was 20 per cent., no matter who the architect was. More clarity was needed in the description of materials. In every specification it should be made plain whether Association or non-Association cables were to be used. Mr. Lightfoot thought the Council should know of a new rule which it was found was being enforced in Manchester, where it was not permissible to fix in a bathroom a towel-rail or other apparatus liable to give shocks to persons who might touch them from the bath. He was given to understand that this was a " Board of Trade " rule. In the preparation of specifications the consulting engineer should specify every item from the beginning to the end, from the main switchboard to the lamp, and the contractor should be paid for everything that he supplied and fitted. The building trade kept its schedules until the job was complete, and the builder was paid on that schedule. If contractors would say they would not send the price schedule to the architect or engineer until the job was completed, he thought an excellent result would be achieved.

Mr. F. W. Cook observed that the keynote of the conference and the solution of the whole of their difficulties could be summed up in the words " Loyalty and co-operation." Everyone of them working in an insular capacity could probably find plenty of grievances, but they would never achieve success by fighting those whom they might regard as business opponents. Prime cost was undoubtedly their great trouble. It was generally understood that prime cost should mean the net cost price of the goods supplied after deducting all trade accounts, except the cash discount. The contractor had to add the cost of the carriage on the goods, profit and fixing. In many cases, especially when the architect or consulting engineer had any suspicions, he could call not merely for the contractors' invoices, but for the receipted accounts to show that the arrangements had been faithfully carried out. The wise contractor would add to prime cost such accessories as lampholders, flex, plugs, screws, &c., together with the profit which he expected. If a provisional sum was named, then the contractor should add to the prime cost all those accessories that were necessary for the fixing of the apparatus. Alluding to Mr. Cross's assertion that some contractors preferred a vague specification, the speaker had no hesitation in saying that if contractors were given a clear-cut specification, they could submit their prices with every confidence. On the guarantee clause, Mr. Cook said he believed that contractors were morally, if not legally, responsible, irrespective of the maintenance and guarantee clause, if there was workmanship or material, which, although it had been passed, was found after the maintenance clause had run its course to be faulty. He had been called in to a job five years after the work had been passed to rectify a fault which did not manifest itself before. It cost him over £20, but he won the confidence of the client. Where there was a possibility of future extensions, the contractor might put in an extra way or two irrespective of the number called for in the specification. To do that would give the contractor the opportunity later on, when the extension was due, of holding the business, without it being put up for competition.

Mr. E. S. New (Chairman, Accumulator Manufacturers' Association) said he hoped that members of the E.C.A. were not of the opinion that private plants were going to cease to exist. Some contractors had built up connections with the owners of private house plants which the supply companies would like to scrap so that the owners would go on to the mains. By taking advantage of the cheap power rate and using a motor to drive the dynamo, energy for lighting could be obtained, even allowing for losses in conversion, at a figure which would allow an ample margin over the lighting rate for battery repairs and depreciation. He had been told by supply authorities first that it was " illegal," and then " immoral " to use electricity generated for power to supply lighting energy through a private house plant.

Mr. W. R. Rawlings said that many specifications from consultants were not really up-to-date from the wiring point of view. Enormous expense was incurred in the preparing of quantities. He had experience of a recent case where six contractors were each involved in an expenditure of about £20, £120 in all. Five out of six sets of quantities were wasted. Each tenderer in preparing quantities took a different view of the job with the result that there were often wide variations in quoted prices. The quantities should be prepared by a good firm of quantity surveyors and a copy should be sent to each contractor. This would eliminate a great deal of waste and bring about a more general level of prices. Concerning time jobs, Mr. Rawlings thought there should be a tight rule for a penalty if the work could not be advanced sufficiently for the contractor to finish what he had to do by the time specified. Contractors also suffered in another way: a client would sometimes hand over a specification which was for anything but good materials. Point this out to the client and he would reply, " Well, it is good enough for me." Thus a bad specification might go to a good firm which would be expected to turn out a good job. The speaker quoted a specimen received from a lady client to show what contractors sometimes had to contend with.

Mr. R. Grierson asked if there was anyone in the electrical industry (or outside it) who did not consider himself fully qualified to re-write the general conditions of contract and general specification. There was one sentence in Mr. Cross's paper which he suggested required reconsideration before it went forward in the printed discussion as emanating from the E.C.A. The statement that inferior material and work had been passed, because the contractor quoted a low price for which he could not carry out the work to specification with profit, implied fraud. Retention was a most important question because of the number of contracts where the actual work turned out to be much greater than at first appeared. He did not see why in the event of fire the whole blame should be put on the sub-contractor for the whole of the building. He questioned whether it was in order to insure against a risk in which the contractor had no insurable interest.

The **President** interposed to remark that he hoped Mr. Cross would not alter any part of his paper. The papers were not official, they represented the authors' views, and the Association did not accept any responsibility for them.

Mr. W. Lang said that cable specifications should be worded with more precision. People sometimes took advantage of the fact that all manufacturers would offer " C.M.A." cables. Specifications should state " cable manufactured by a member of the Cable Makers' Association." " Ite " cables were not intended to displace india-rubber or vulcanite cables, and required conduits about twice the ordinary size. They were made with the object of removing as far as possible rubber as a principal constituent part. " Ite " cables were stiffer than rubber cables, and therefore required adequate protection; they also stood up better to the extremes of heat and cold and could withstand a temperature of 170 deg. A drawback of rubber was its liability to be affected by the oxygen of the air.

The **President** alluded to the statement made earlier on in the discussion concerning bathroom appliances. There were no Board of Trade or I.E.E. Regulations dealing with this matter, but the situation in Manchester might be influenced by local regulations.

Mr. Cross, in winding up the discussion, said he was glad the matter of fire risks had been raised, but an even greater risk was the third-party risk. The standard policy was good up to £10,000, but members would be interested to know that the Council was going into the matter of getting a full cover for the limit for which the contractor might be liable. On prime costs he would like to see one definition accepted universally. Replying to Mr. New, he said that the question of the use of batteries for house installations when a public supply was available was a difficult one, but he did suggest that to take electricity from a supply authority and pass it through a battery was going to be more expensive than retaining an oil or a crude oil engine. He would prefer leaving the existing plant and battery until they were worn out, and then decide whether it would be cheaper to replace them or pay a service charge to the supply authority. As regards " Ite " cables, his difficulty was to specify them without mentioning the manufacturers.

Australian Imports and Exports.

Values for 1927-8 and 1928-9 Compared.

THE following figures showing the values of the imports of electrical goods into Australia in the fiscal year 1928-29 have been taken from the recently-issued official trade returns. The corresponding figures for the previous twelve months have been added for the purposes of comparison, and notes of increases or decreases are given. There is a brief reference also to Australia's electrical exports.

Imports.

	1927-28. £	1928-29. £	Inc. or dec. £
Arc lamps, except for kinematographs—			
Total	2,400	1,700	− 700
From United Kingdom	800	80	− 720
,, Germany	400	800	+ 400
,, United States	1,000	700	− 300
Batteries (storage) and accumulators—			
Total	730,000	*	—
From United Kingdom	266,000	*	—
,, Canada	6,000	*	—
,, Denmark	25,500	*	—
,, France	2,600	*	—
,, Germany	17,500	*	—
,, United States	410,000	*	—
Cable and wire, covered with cotton—			
Total	26,000	22,000	− 4,000
From United Kingdom	25,000	21,000	− 4,000
,, United States	600	200	− 400
Cable, telegraph and telephone, paper insulated, lead covered—			
Total	73,000	35,500	− 37,500
From United Kingdom	71,000	35,500	− 35,500
Other telegraph and telephone cable—			
Total	1,623,000	1,260,000	−363,000
From United Kingdom	1,543,000	1,193,000	−350,000
,, Holland	15,000	14,000	− 1,000
,, United States	30,000	30,000	—
,, Germany	19,000	14,000	− 5,000
Carbon manufactures—			
Total	33,000	30,000	− 3,000
From United Kingdom	17,000	13,000	− 4,000
,, United States	10,000	11,000	+ 1,000
,, Germany	4,000	3,000	− 1,000
Dynamo-electric machines, a.c.—			
Total	576,000	478,000	− 98,000
From United Kingdom	406,000	326,000	− 80,000
,, Switzerland	22,000	11,000	− 11,000
,, Germany	11,000	15,000	+ 4,000
,, United States	110,000	107,000	− 3,000
Dynamo-electric machines, d.c.—			
Total	366,000	261,000	−105,000
From United Kingdom	256,000	185,000	− 71,000
,, Germany	22,000	19,000	− 3,000
,, Switzerland	15,000	2,300	− 12,700
,, United States	59,000	47,000	− 12,000
Dynamo-electric machines, universal—			
Total	13,000	7,300	− 5,700
From United Kingdom	6,000	2,700	− 3,300
,, United States	5,000	3,700	− 1,300
Fans, electric—			
Total	48,000	42,000	− 6,000
From United Kingdom	9,000	7,000	− 2,000
,, Italy	18,000	18,000	—
,, United States	15,500	10,000	− 5,500
Lighting plant (exclusive of batteries) having an internal combustion engine not exceeding 4 h.p., direct coupled to dynamo—			
Total	57,000	18,400	− 38,600
From United Kingdom	16,000	5,600	− 10,400
,, United States	39,000	11,500	− 27,500
Switches, fuses and lightning arrestors—			
Total	375,000	436,000	+ 61,000
From United Kingdom	280,000	330,000	+ 50,000
,, Japan	100	100	—
,, United States	82,000	96,000	+ 14,000
,, Germany	7,000	5,300	− 1,700
Heating and cooking appliances—			
Total	97,000	105,000	+ 8,000
From United Kingdom	28,000	34,000	+ 6,000
,, Canada	14,000	21,000	+ 7,000
,, United States	42,500	39,000	− 3,500
Lamps, filament—			
Total	575,000	664,000	+ 89,000
From United Kingdom	300,000	296,000	− 4,000
,, Hungary	6,000	4,000	− 2,000
,, Austria	16,000	18,000	+ 2,000
,, Holland	181,000	252,000	+ 71,000
,, United States	52,000	51,000	− 1,000
Measuring and recording instruments—			
Total	162,000	154,000	− 8,000
From United Kingdom	81,000	73,000	− 8,000
,, Switzerland	17,000	20,000	+ 3,000
,, United States	45,000	40,000	− 5,000
,, Canada	16,000	17,500	+ 1,500
Regulating and controlling apparatus—			
Total	327,000	297,000	− 30,000
From United Kingdom	206,000	182,000	− 24,000
,, United States	106,000	101,000	− 5,000
,, Switzerland	2,700	3,700	+ 1,000
,, Canada	5,000	3,400	− 1,600
Static transformers and induction coils—			
Total	180,000	142,000	− 38,000
From United Kingdom	128,000	95,000	− 33,000
,, Sweden	9,500	4,500	− 5,000
,, United States	21,000	24,000	− 3,000
Telegraph instruments and appliances—			
Total	18,000	3,000	− 15,000
From United Kingdom	17,000	2,500	− 14,500
,, United States	1,000	500	− 500
Telephones—			
Total	106,000	64,000	− 42,000
From United Kingdom	81,000	52,000	− 29,000
,, Sweden	600	600	—
,, United States	19,000	9,000	− 10,000
,, Germany	1,600	2,400	+ 800
Telephone switchboards and appliances—			
Total	732,000	297,000	−435,000
From United Kingdom	601,000	260,000	−341,000
,, Belgium	49,000	7,000	− 42,000
,, Sweden	1,300	1,700	+ 400
,, United States	76,000	20,000	− 56,000
Vacuum tubes, electrical—			
Total	23,000	31,000	+ 8,000
From United Kingdom	6,700	6,000	− 700
,, Holland	6,500	16,000	+ 9,500
,, United States	9,000	9,000	—
Valves for wireless telegraphy or telephony—			
Total	179,000	225,000	+ 46,000
From United Kingdom	64,000	61,000	− 3,000
,, Holland	59,000	105,000	+ 46,000
,, United States	53,000	53,000	—

* Reclassified in 1928-29 as follows:—Dry cells: Total £180,000, including £134,000 from U.S.A.; Nickel alkaline batteries: £4,150, all from U.K.; Storage batteries having plates of sizes larger than 7¾ in. by 10 in.: £21,000, including £18,000 from U.K.; Other storage batteries: £449,000, including £247,000 from U.K. and £188,000 from U.S.A.

Wireless receiving sets, including loud speakers and wireless parts—	1927-28. £	1928-29. £	Inc. or dec. £
Total	376,000	399,000	+ 23,000
From United Kingdom ...	119,000	85,000	− 34,000
,, France	7,000	1,000	− 6,000
,, Germany	22,000	28,000	+ 6,000
,, Holland	18,000	32,000	+ 14,000
,, United States ...	208,000	251,000	+ 43,000
Electrical appliances, n.e.i.—			
Total	415,000	442,000	+ 27,000
From United Kingdom ...	237,000	197,000	− 40,000
,, Canada	7,600	6,000	− 1,600
,, Denmark	1,000	100	− 900
,, Germany	37,000	34,000	− 3,000
,, Japan	800	100	− 700
,, United States ...	114,000	151,000	+ 37,000
,, Switzerland ...	4,700	1,000	− 3,700
Electrical ware of earthenware, including insulators—			
Total	31,000	47,000	+ 16,000
From United Kingdom ...	4,000	6,000	+ 2,000
,, Canada	1,400	1,900	+ 500
,, Japan	3,800	2,600	− 1,200
,, United States ...	16,000	33,000	+ 17,000

Electrical insulating paper and boards—	1927-28. £	1928-29. £	Inc. or dec. £
Total	26,400	28,400	+ 2,000
From United Kingdom ...	14,000	18,000	+ 4,000
,, United States ...	5,600	7,000	+ 1,400

Exports.

Australia carries on a small export trade in electrical goods of her own manufacture. Below are given the comparative values in 1927-28 and 1928-29 :—

Electrical machinery and appliances—	1927-28. £	1928-29. £	Inc. or dec. £
Total	59,000	31,000	− 28,000
To New Zealand	16,000	21,000	+ 5,000
,, Fiji	—	2,000	+ 2,000
,, New Guinea	1,000	1,000	—
,, India	600	150	− 450
,, France	17,000	—	− 17,000
,, British Malaya	18,000	400	− 17,600
Other electrical materials—			
Total	16,500	30,000	+ 13,500
To New Zealand	12,000	21,000	+ 9,000

Electric Houses at Woolwich.

A recent article suggesting means of encouraging the all-electric house has called forth a letter from Mr. G. W. Keats, borough electrical engineer of Woolwich, in which he shows what his Council has done in this important matter.

WE have received the following communication from Mr. G. W. Keats, borough electrical engineer of Woolwich :—

My attention has been directed to an article appearing in your issue of June 20th entitled "Electrical Development—A Proposal," by Mr. Ben Quarmby. I notice in this article that Mr. Quarmby has advocated the abolition of chimneys, fireplaces and gas fires, and the adoption of electrical heating in place of coal.

He also refers to a speech made by the Minister of Health at a recent Health Exhibition in Manchester, and suggests that the Minister should put into practice what he preaches in the housing problem, and that the new housing schemes should be equipped with electric heating instead of carrying on as at present on the old orthodox lines, with chimneys and provision for the consuming of fuel.

May I draw your readers' attention to the fact that in Woolwich on the Council's housing scheme, there are over 2,000 houses, and that hundreds of these houses are not equipped with chimneys or fireplaces, with the exception of one slow combustion stove, and that this housing scheme has been in progress since 1922.

You will be interested to know that the consumption of electrical energy on this estate for the past twelve months has amounted to 6,914,674 kWh, and has brought in a revenue of £28,878 for lighting, heating and cooking purposes.

The consumers are charged for the supply on a two-part tariff, and the money is collected through a prepayment meter, and by means of weekly rent, which suggests that Mr. Quarmby's proposals are rather behind the times.

I would like to make the suggestion that local authorities should give a rebate in assessing the amount of rates to be paid on the rateable value of the house for those houses which have abolished burning raw fuel, with the exception of coke for use in a slow combustion stove for hot water.

The cost of the supply of electricity in this borough is one of the lowest in the country, and no further reduction can be made, but it would certainly give considerable preference to the "all-electric house," leading to the abolition of the smoke nuisance, creating a cleaner atmosphere and a more healthy city if those people who help towards this were given some relief from the rates which they pay to the local authorities.

I have pleasure in enclosing an aerial photograph of this estate taken more than two years ago.

We were aware of the Woolwich Council's activities in this direction but at present there are very few estates of this nature. May they increase in number!

Surrey Flying Services.]

Electric Houses on the Woolwich Borough Council's Estate.

New Electrical Devices, Fittings, and Plant.

Readers are invited to submit particulars of new or improved devices and apparatus for publication in this section.

A Special Local-lighting Fitting.

The "TYPERLITE" Co., 86, Cannon Street, E.C.4, has recently produced a special fitting for use with typesetting machines. The light can be adjusted to suit the exact individual requirements of the operator by means of the specially designed ratchet, base and flexible head, so that it is directed only on to those parts requiring illumination, thus obviating unnecessary reflection from the polished surfaces of the machine. Fig. 1 illustrates the full flexibility of this fitting, showing the arm raised so as to throw the light inside the mechanism of the machine; in the event of the operator wishing to make adjustments, he has both hands free to work with. The whole fitting is pleasingly finished in steel-bronze, thus harmonising with the surrounding steelwork. Where the manufacturers' standard fittings are installed, it is only necessary to remove the fixing bracket and screw the

Fig. 1.—"Typerlite" Illuminating Interior of Typesetting Machine.

new "Typerlite" on in its place, utilising the same fixing holes. The fitting has been designed from standard parts, and with a slight variation in the base it can be adapted to any number of the printing processes where a local light is required for detail work.

An Automatic Emergency-supply Switch.

Inquiries from hospitals for a switch capable of automatically bringing into service an emergency lighting supply from either mains or battery in the event of a failure of the main supply, irrespective of whether the main supply was a.c. or d.c., led to the invention by Mr. E. Wolf, B.Sc., a director of GENERAL INSTALLATION CO., LTD., 183, Edgware Road, Hyde Park, W.2, of such an apparatus. The switch is designed on very simple lines, and the underlying idea is that a keeper is held across an electro-magnet all the time the main supply is functioning, but when the main supply fails the keeper is withdrawn by a strong spring, so as to close the auxiliary circuit. The switch is said to be marketed at very low cost, as the inventor has no desire to make money out of a cause for the suffering.

A New Rectifier Set.

The "Davenset" three-phase rectifier, fig. 2, a recent production of Messrs. PARTRIDGE, WILSON & CO., Leicester, consists essentially of a robust tri-anode gasfilled rectifying valve

Fig. 2.—"Davenset" Three-phase Rectifier.

housed inside a suitably ventilated black-crystallined steel case. When in operation, the three phases of the a.c. supply are directly connected to the valve's respective three anodes, so that a filament-current transformer only is required, thereby eliminating losses, simplifying the construction, and allowing for the production of a rectifier having a high electrical efficiency. "Zed" indicating fuses are fitted to protect the phases and the rectified-output circuit. The apparatus is claimed to be silent in operation and non-radiating. A d.c. output voltage of 270 is obtained when rectifying a supply having a pressure between line and neutral of 250 volts. The maximum d.c. output of the set is 6 A at 235 V, or 5.22 A at 270 V, and the consumptions at no-load and full-load are, respectively, 20 W and 1.49 W. The full-load efficiency is 94.7 per cent., and the efficiency at half load is 93.4 per cent. The overall dimensions of the set are 15 in. high, 11¼ in. wide, and 11¼ in. deep, including controls. The total weight of the apparatus is 22 lb. It is finished with the bright parts chromium plated.

A Trailing-Cable Tester.

A large proportion of electrical accidents in mines and situations where portable apparatus is employed is due to defective

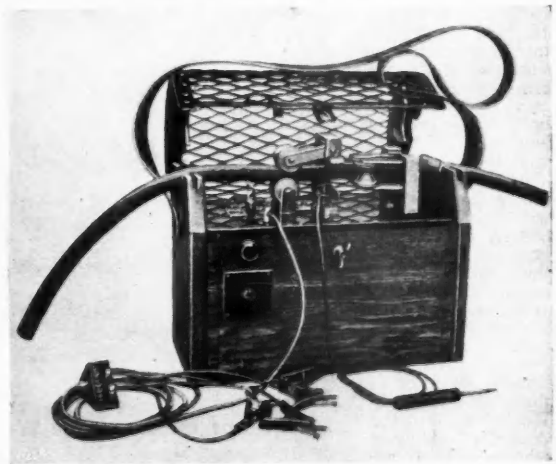


Fig. 3.—The "Allscott" Trailing-Cable Tester.

trailing cables, and stringent regulations are in force for the periodical examination of such cables. The "Allscott" cable tester, fig. 3, a product of Messrs. JAMES SCOTT & CO., Inglis

Street, Dunfermline, is designed to show when a trailing cable is unsafe, and also where the unsafe portion actually is, so that it can be easily repaired. For ordinary purposes a trailing cable is really unsafe when the outer tough-rubber sheathing surrounding the cores of the flexible earthed armouring becomes damaged to such an extent as to allow an operator's hand to come in electrical contact with an insulated or bare live core, or bare earth surrounding shield, and the testing apparatus in question is based on this principle.

The tester embodies an accumulator which feeds an induction coil designed to give a voltage of from 1,000 to 7,000. An adjustable spark gap is placed in parallel with the high-voltage output of the coil and the insulation of the cable to be tested. The cable is drawn through rollers which are so designed as to cover the whole surface of the cable, and the high voltage is stressed between the cores of the cable and its sheathing, the rollers being at the high potential. When a faulty part of the cable passes the rollers, a spark jumps across at the actual fault, and the permanent spark gap either ceases or diminishes, depending on the extent of the faulty insulation of the cable. The sound of the permanent spark also varies, which ensures that a fault is not passed without notice being taken of it. The voltage applied across the gap and the cable can be varied, so that an operator can actually decide his own standard of test. No undue stress is placed on the insulation, as the test is a momentary one. Very rapid testing is possible, and a standard length of 110 yards can be tested in about ten minutes. The instrument is claimed to be fool-proof, the high-voltage parts being protected by a strong guard which is earthed. All parts liable to be touched are earthed, and collector brushes are fitted to take any stray high-pressure currents on the surface of the cable, an extra precaution for when the cable undergoing test is damp. An earthing terminal is provided. An interlocking switch ensures that the apparatus cannot be operated without the guard being in its place. The instrument is so arranged that the cable can be inserted without threading, or taking off the pommels at the end. The instrument is sold complete with flexible and special terminal grips to fit male and female sockets as are usually fitted on standard pommels, and therefore no disconnection or making or bridging connections are required at the pommels. The overall sizes of the instruments are 18 in. long, 16½ in. high, and 9 in. broad. The weight is 46 lb.

Parliamentary News.

[By Our Special Parliamentary Reporter.]

Postal Service Finance.

On June 24th Mr. GRAHAM WHITE asked the Postmaster-General what were the surpluses in mail services and telephones, respectively, and the deficit in telegraphs for the year ended March 31st, 1930.

Mr. LEES-SMITH said that final figures for the year ended March 31st, 1930, were not yet available. The provisional figures were:—Postal services: surplus, £9,638,000; telephone services: surplus, £518,000; telegraph services: deficit, £785,000; net surplus, £9,371,000.

Street Repairs.

On June 25th Mr. LOVAT FRASER asked the Minister of Transport if he was aware of the lack of co-operation between local authorities and gas, light, and water companies in London, and of the inconvenience and annoyance caused to the ratepayers by the laying down of streets and the tearing up of them at short intervals; and if he would take steps to introduce co-ordination in this matter.

Mr. MORRISON said there was already a measure of co-ordination under the London Traffic Act, 1924, between local authorities and statutory undertakers having power to break up streets. Substantial works of road maintenance and improvement in streets prescribed under Section 4 of that Act which included the main routes in the London traffic area might only be carried out in such order and at such times as might be determined in a scheme to be drawn up by him. The undertakers concerned were advised of the dates of such road works so that any works which they might propose could be carried out at the same time, and upon the completion of the road works it was unlawful for such undertakers to break up the street within the ensuing 12 months, except with his consent or in case of emergency.

Relief Works.

On June 25th Mr. E. BROWN asked the Minister of Labour whether, in her negotiations with local authorities and other bodies in respect of unemployment grants for accelerated works of a revenue-producing character, such as electricity undertakings, they were informed that such grants were liable to income tax at the full rate.

Mr. LAWSON, who replied, said that the answer was in the negative.

Telephone Lines.

On June 25th Mr. DAY asked what progress had been made during the previous 12 months for the replacement of main traffic and other cable telephone lines, respectively.

Mr. LEES-SMITH said that during the financial year 1929-30 approximately 426,000 miles of wire were provided in underground cables for the purposes of general development and diversion of overhead circuits.

Legal.

Breach of Electricity Regulations.

AT Fleetwood, on June 26th, Messrs. Tattersall, Ltd., electrical engineers, Rochdale, were summoned for a breach of regulations under the Factory and Workshops Act.

Inspector Roos said that a house at Poulton was being altered to form a convalescent home and defendants were contractors for the electrical work. An apprentice was killed and it was found that there was a quarter of an inch of water in a duct carrying electric wires.

Mr. W. SUNDERLAND (Poulton), in the employ of defendants, said that the lampholder in use was of brass. The wires were not earthed, and the pressure was 200 volts. Since the occurrence shockproof lamps had been installed.

Mr. A. J. MACAULAY (Electrical Inspector of Factories) stated that the wiring to the lamp was in a duct which contained water, and there was no attempt at insulation.

Counsel for defendants pointed out that the company was of high standing and no negligence was suggested on their part. He submitted that the place was not a factory within the meaning of the Act.

The company was fined £3, and ordered to pay 28s. costs.

Triotron Radio Valve Co., Ltd., v. Pearl & Pearl.

IN the Chancery Division before Mr. Justice Eve on June 27th, Mr. D. H. Corsellis mentioned the case of the Triotron Radio Co., Ltd., against Pearl & Pearl on a motion for an injunction to restrain infringement of plaintiffs' patent. Counsel said the patent was connected with radio valves, and the infringing valves put on the market were called "Tungsram." Defendants, who were retailers, appeared by counsel, and consented to treat the motion as the trial of the action, to submit to a perpetual injunction in terms of the writ, and to pay £5 as damages and £10 towards the costs. They also submitted to an Order to deliver up on oath any infringing valves.

Mr. S. ISAACS, for the defendants, consented to the Order.

Mr. Justice Eve granted the Order as arranged.

Workmen's Compensation Act Claim.

IN the Shoreditch County Court on June 26th, before Deputy-Judge Thesiger, Alfred L. J. Treacher, an electrician, applied for compensation under the Workmen's Compensation Act, the respondents being Messrs. Mather Bros., Farringdon Street, E.C., electrical engineers. It was stated that in October last year while the respondents were carrying out electrical work the applicant fell down a lift well, sustaining concussion of the brain. He put his earnings at £4 10s. a week, and he had been paid 30s. a week until April 22nd.

The applicant said that although it was suggested that he was fit and well to go back to work, he had occasional fits of giddiness, and he therefore did not think it was safe that he should work amongst high-powered electrical machinery A doctor called on his behalf said that a man who suffered from giddy fits was involved in risks in working among such machinery.

A medical expert, who appeared for the respondents, said that he thought that if the applicant went back to work he would forget all about his nerves, and he would do his work as well as he had done it before. He agreed that if Treacher were working among high-powered electrical machinery and he had a giddy fit there was a risk of serious consequences.

Judge Thesiger, in his decision, said that he took the applicant as a perfectly honest man, and that the headaches were the nervous result of the accident. He thought that if the man could be induced to do some work his condition would improve rapidly. At the same time if the man became giddy there might be some very serious results, and therefore it would be hardly right for him to go straight back to work He therefore reduced the applicant's money by 10s. a week, making the award £1, because he could do some work.

The Peto-Scott Co., Ltd.

MR. Justice Bennett in the Chancery Division on June 30th adjourned for a month a petition for the compulsory winding up of the Peto-Scott Co., Ltd.

Counsel for the petitioners said that the matter had been standing over for a scheme to go through. The company was still going on with the scheme and it was hoped eventually that a settlement would be reached. They asked for an adjournment for four weeks. His Lordship assented.

The Wireless Distributing Co., Ltd.

IN the Chancery Division on June 30th, Mr. Justice Bennett had before him an application to restore to the company register the name of the Wireless Distributing Co., Ltd.

Mr. J. D. JOHNSTON said the company's name was struck off owing to the admitted negligence of the secretary, no returns having been made over a long period. The directors expressed their regret and undertook to render the returns forthwith. The offices of the company were at Walmer House, Regent Street, and its objects were to manufacture, buy and sell wireless apparatus. The company was perfectly solvent.

Mr. CROSSMAN, for the Registrar, did not oppose the application subject to the returns being made.

His Lordship granted the application and said that directors must remember that the provisions of the Companies Act were intended for the public benefit. The company must satisfy the Court that the returns in question had been rendered.

Correspondence.

Correspondents should forward their communications **as early as possible.** *No letter can be published unless we have the writer's name and address in our possession.*

Electric or Petrol Lawn Mowers?

I have recently been to conferences at Hastings and Bournemouth and am writing to you to remark upon the contrast between these two resorts in the matter of the lawn mowers in use in the public gardens and on bowling greens.

In Hastings, which caters for an entirely different class of public from Bournemouth, I noticed on one of the bowling greens a Ransomes' electric lawn mower. In Bournemouth the visitors in the public gardens were entertained with the noise and smell of a petrol mower, which was clanking its way amongst the beds of beautiful flowers.

Surely here is one instance in which electricity can be given preference over petrol? The internal-combustion engine has become the bane of our lives in the streets, and a little change from its clangorous and odoriferous presence would surely be welcome.

With great respect may I suggest that the electricity departments in many hundreds of towns using lawn mowers for tennis courts, bowling greens, and public gardens take a hand and get the petrol machines removed?

There appears to be not the slightest difficulty in operating the electrically-driven mower by means of a long length of c.t.s. flex.

W. E. Warrilow.

Oxhey, Herts.
June 25th, 1930.

The Engineering Degrees of the University of London.

The article in your issue of May 23rd thus entitled has only just come to my notice. Its statement that the circumstances of preparation for a London University Engineering Degree are such as to cause the neglect of general education is one which I heartily endorse. It may be a surprise to many to learn that "the holder of a degree in one of the premier universities may have reached no higher a standard of general education than is covered by the meagre requirements of the London Matriculation examination," but it is undoubtedly a fact. The curriculum is, in most cases, designed to exclude all but those subjects either leading up to, or actually required for, the examination. Were other subjects, such as modern languages, industrial history, or economics (referred to by your contributor) required by the examination, most students would regard them as so much waste energy. They would be taken in much the same spirit as French is now taken for matriculation by prospective engineering students—that is, with the feeling that it is a painful necessity and that with good fortune one may just scrape through, and forget all about the subject afterwards. Were they not required for the examination, to teach them would be futile. No student would regard them seriously and lectures would be "cut." The necessities of the examination leave no time for the necessities of a general education.

With the examination syllabus as it stands at present, it would be impossible for students to gain any broader education. It might be thought that the student could improve his standard of general education in his spare time; this, however, is, generally speaking, not the case—at any rate if a "first" in engineering is his objective. The whole time from week-end to week-end is practically booked up, and that small amount of it which is devoted to leisure is generally spent in keeping physically fit. Practically everything of cultural value must be neglected; newspapers are not read, and the technical press is only consulted as a matter of duty. The result is as precisely described in the article to which I refer; the engineering graduate may possess a knowledge of engineering technology which is unquestionable, but at the same time be thoroughly ill-educated, ignorant of the history or literature of even his own country, and of the elements of social science.

Whilst at college the student may realise what he is missing, but the exigences of the situation present no alternative and he submits—with the fervent hope that when all examinations are over he will have time to devote to wider interests. But the road he travels is a long one and at the end he may find, as did Charles Darwin to his regret, that over specialisation has resulted in a lost taste for other things.

A modern university engineering degree demands a higher price than is usually thought and only afterwards is this realised to the full. The B.Sc.(Eng.) degree of the University of London may be held in high esteem as your contributor says, but the holder of it may at times look enviously at graduates of the older universities who, although they may be transparently ignorant of the details of present-day engineering practice, yet in matters of general education may be far in advance of the "matriculation" educated engineer.

The fault, however, cannot be laid entirely at the doors of the London University examination system for engineers. The engineering student, with one eye on the examination syllabus and the other on a very practical industry, can only with the greatest difficulty be convinced that any other subject than those definitely related to these objects is worthy of his consideration.

H. G. Taylor, M.Sc.(ENG.).

London, N.W.6, *June 24th*, 1930.

Inferior Installation Work.

I was rather amused on reading in to-day's ELECTRICAL REVIEW the report of the discussion of a small town council in the Midlands on the question of assisted wiring schemes and the status of the contractors. The financial gain from these schemes, from the point of view of the ratepayers, is extremely doubtful, if the initial costs of installation are to be borne by the ratepayers. If the consumer, by paying an increased price per kWh, is to repay the cost, then it will take any ordinary consumer many years to clear the initial charges. Borough engineers should give lantern lectures in their districts explaining the necessary precautions to be taken when metal-sheathed wiring is used. There are districts where small dwellings have been wired with C.M.A. lead-covered cable, but no care has been taken to see that the covering is metallically bonded and last, but not least, properly earthed.

If electricity is to increase in popular use and be for the financial benefit of the ratepayers as well as for their better health, those responsible for electrical supply must realise their public duty.

This week is my seventeenth anniversary in my profession, and I am able, although not yet forty, to look back to those days which were days of the craftsman.

Tauphi.

June 27th, 1930.

[This letter has been abbreviated.—EDS. ELEC. REV.]

Is it not time that electrical contractors got together to prevent the shoddy work which is so prevalent in the London suburbs. It seems that there are a few so-called contractors who make a practice of competing against one another for new estate work, thus having to employ boy labour and cheap material. In some houses maids and owners alike run a continual risk of receiving a severe shock. So let them pull up their socks and keep skilled workmen employed!

Interested Worker.

June 25th, 1930.

The Neon Lamp as a Glow Relay.

The ordinary "Osglim" neon lamp, according to a correspondent in *Nature*, forms a convenient and sensitive glow relay if furnished with a third electrode which may take the form of a strip of metal foil 1½ in. wide, pasted on the outside of the lamp to surround the internal electrodes. The type of "Osglim" lamp most suitable is that known as the beehive, in which the electrodes take the form of a disc and spiral.

This form of glow relay is sometimes conveniently used in conjunction with a photo-electric cell, to indicate when a required light intensity is falling upon the cell.

The disk electrode of the lamp is connected to the negative end of the battery, and the voltage adjusted on the spiral until the glow discharge is just avoided; usually about 132 volts is sufficient.

The external electrode of the neon lamp is connected to the cathode of the photo-electric cell, and the anode of the cell to a suitable positive tapping on the same battery. Illumination of the cell will then promote discharge within the neon lamp, passing sufficient current to operate a magnetic relay.

The glow relay with the external third electrode enables two circuits to be kept entirely separate from one another. Not every "Osglim" neon lamp is suitable, due to variations in the insulation resistance and probably also to less suitable gas pressure.

These neon lamps also exhibit a photo-electric property; if the voltage on the third electrode is raised just sufficiently to produce the discharge, illumination of the electrodes by, say, a gasfilled lamp will prevent but not discontinue the discharge.

Published Specifications.

Compiled expressly for this journal by a firm of Chartered Patent Agents. The numbers in parentheses are those under which the specifications will be printed and abridged and all subsequent proceedings taken.

1928.

34,810. "Apparatus embodying electric discharge lamps." Gramophone Co., Ltd., and C. O. Browne. August 26th, 1929. (330,196.)

35,942. "Variable electric condensers." B. Hesketh. December 6th, 1928. (330,293.)

37,930. "Electrical supervisory signalling systems." Compagnie Française pour l'Exploitation des Procedes Thomson-Houston and P. Toulon. December 22nd, 1927. (302,937.)

38,561. "Thermionic cathodes." British Thomson-Houston Co., Ltd. December 31st, 1927. (303,381.)

1929.

2,900. "Insulation of cable joints." Norddeutsche Kabelwerke Akt. Ges. and Dr. V. Planer. January 28th, 1928. (305,046.)

3,345. "Systems of electric distribution." British Thomson-Houston Co., Ltd. January 31st, 1928. (305,145.)

3,449. "Incandescent electric lamps." J. L. Pech. February 3rd, 1928. (305,227.)

3,479. "Regulating the distribution of current in the inter-connecting feeders of alternating-current electric supply systems." Siemens-Schuckertwerke Akt. Ges. February 3rd, 1928. (305,232.)

6,325. "Photo-electric cells." Naamlooze Vennootschap Philips' Gloeilampenfabrieken. September 25th, 1928. (319,650.)

6,326. "Electric fires." S. Z. de Ferranti and Ferranti, Ltd. February 26th, 1929. (330,235.)

6,633. "Thermionic valves." Dr. B. Loewe. March 1st, 1928. (307,028.)

6,748. "Subaqueous sound transmitters." Electroacoustic Ges. March 10th, 1928. (307,495.)

6,878. "Incandescent bodies, such as filaments for electric incandescent lamps, vacuum tubes, and the like." Siemens & Halske Akt. Ges. April 12th, 1928. (309,536.)

6,890. "Means of controlling regeneration in electrically-propelled vehicles." W. A. Stevens. March 4th, 1929. (330,259.)

6,968. "Electric filaments and resistances.' S. G. S. Dicker (Naamlooze Vennootschap Philips' Gloeilampenfabrieken). March 4th, 1929. (330,280.)

6,972. "Transmission of radio signals." S. G. S. Dicker (Naamlooze Vennootschap Philips' Gloeilampenfabrieken). March 4th, 1929. (330,281.)

6,987. "Electric insulating material and method of making the same." R. Haddan (Corning Glass Works). March 4th, 1929. (330,268.)

6,995. "Protective arrangements for electrical systems." Associated Electrical Industries, Ltd. March 3rd, 1928. (307,299.)

7,005. "Electrical connecting devices." A. Bray, G. Bray, and G. Bray and Co., Ltd. March 4th, 1929. (300,269.)

7,147. "Electric switches." R. Atkins, A. E. Frearson, and Ormond Engineering Co., Ltd. March 5th, 1929. (330,288.)

7,166. "Electric phonographs." Igranic Electric Co., Ltd. April 11th, 1928. (309,484.)

7,299. "Electric motor-control systems." General Electric Co., Ltd., C. W. Saunders, H. W. Wilson, and S. A. G. Emms. March 6th, 1929 (330,300.)

7,308. "Devices for securing the ends of cables to magneto distributors or other apparatus." British Thomson-Houston Co., Ltd., L. Griffiths, and C. J. Morton. March 6th, 1929. (330,301.)

8,077. "Automatic switches for use in telephone or like systems." Automatic Telephone Manufacturing Co., Ltd., and C. E. Beale. March 12th, 1929. (330,311.)

8,078. "Voltage-control equipment for electrical apparatus." Automatic Telephone Manufacturing Co., Ltd., and T. R. Rayner. March 12th, 1929. (330,312.)

8,184. "Braking arrangement for Ward Leonard winding apparatus." Siemens-Schuckertwerke Akt. Ges. March 14th, 1928. (307,839.)

8,372. "X-ray apparatus." E. J. Ward-Watkinson. March 14th, 1929. (330,318.)

8,711. "Contact-making relays, particularly for electric signalling systems." British Thomson-Houston Co., Ltd. March 17th, 1928. (308,172.)

9,719. "Thermionic cathodes." E Y. Robinson and Associated Electrical Industries, Ltd. March 26th, 1929 (Addition to 278,787.) (330,331.)

9,901. "Telephone transmission systems, particularly two-way repeaters." Telefonaktiebolaget L. M. Ericsson. March 31st, 1928. (308,816.)

10,271. "Electromagnetically-controlled hydraulic governors for electric metallurgical furnaces." L. Tagliaferri. April 2nd, 1929. (330,337.)

10,469. "Telephone systems." Siemens Bros. & Co., Ltd., and H. E. Humphries. April 4th, 1929. (330,339.)

11,090. "Electrical switchgear." A. F. Harmer and Drake & Gorham, Ltd. April 10th, 1929. (330,347.)

11,971. "Contact arrangements of links and other members for insertion in electric circuits." W. T. Henley's Telegraph Works Co., Ltd., and E. Moor. April 17th, 1929. (330,354.)

12,063. "Electric contactor apparatus for rheostatic and like purposes." English Electric Co., Ltd., and E. J. Bertles. April 18th, 1929. (330,355.)

13,100. "Suspending devices for electric conductors." J. W. Hofmann (trading as J. W. Hofmann (firm of). April 27th, 1929. (330,363.)

13,101. "Clamps for hollow electric cables." J. W. Hofmann (trading as J. W. Hofmann (firm of)). April 27th, 1929. (330,364.)

13,559. "Process for the manufacture of oxide sulphide and haloid cathodes for electric discharge devices." Vereinigte Glohlampen und Elektricitäts Akt. Ges. June 8th, 1928. (313,151.)

14,288. "Navigation and aviation lights." J. P. Bowen. May 8th, 1929. (330,375.)

14,556. "Picture telegraph and the like systems." Etablissements E. Belin. May 9th, 1928. (311,346.)

14,684. "Junctions for cables." Felten & Guilleaume Carlswerk Akt. Ges. May 11th, 1928. (311,416.)

15,180. "Device for switching on electric lamps at predetermined times." W. C. Fisher. May 15th, 1929. (330,382.)

16,259. "Pressure-operated electric switches." J. W. White. May 27th, 1929. (330,388.)

16,674. "Thermionic valve amplifiers." J. Feldman. March 20th, 1929. (330,395.)

17,074. "Crystal detectors." J. Liebewein and F. Pojer. June 4th, 1928. (313,005.)

18,055. "Electric cable joints." Siemens Bros. & Co., Ltd., J. Riedl, and H. G. Wood. June 12th, 1929. (330,406.)

18,095. "Transmitting and receiving apparatus for use in television and telekinematography." L. Thurm June 12th. 1928. (313,504.)

20,313. "Electric lamp lanterns." General Electric Co., Ltd., and S. Kates. July 2nd, 1929. (330,425.)

20,600. "Swivelling bases for overhead electric trolley poles." A. M. Willis, Brecknell Willis & Co., Ltd., and R. H. Wilkinson. July 4th, 1929. (330,162.)

20,924. "Electric dry cells." Siemens Bros. & Co., Ltd. (General Dry Batteries, Inc.). July 8th, 1929. (330,165.)

22,856. "Manufacture of electric cables." Kabelfabrik-und Drahtindustrie Akt. Ges. August 16th, 1928. (317,440.)

23,566. "Auto-transformers with variable ratios of transformation." Electrical Apparatus Co., Ltd., and R. H. Barbour. July 31st, 1929. (330,181.)

26,565. "Voltage control of electric transformers." Electrical Apparatus Co., Ltd., and R. H. Barbour. August 31st, 1929. (330,192.)

26,888. "Oil-immersed electrical apparatus." British Thomson-Houston Co., Ltd. September 4th, 1928. (318,525.)

27,837. "Electric switches." Associated Electrical Industries, Ltd. September 13th, 1928. (318,973.)

23,027. "Galvanic batteries." L. Fuller and G. J. A. Fuller. July 26th, 1929. (330,444.)

29,385. "Signalling systems." Telefunken Ges. für Drahtlose Telegraphie. October 31st, 1928. (330,477.)

30,173. "Manufacture of tele-communication cables." Lignes Télégraphiques and Téléphoniques. October 18th, 1928 (329,603.)

30,765. "Insulating material for electric condensers and the like." J. E. G. Lahousse. October 22nd, 1928. (329,604.)

33,009. "Frequency transformation of electric oscillations." Naamlooze Vennootschap Philips' Gloeilampenfabrieken. November 2nd, 1928. (329,610.)

35,338. "Volume-control means for radio receivers and the like." British Thomson-Houston Co., Ltd. November 19th, 1928. (330,211.)

35,529. "Television apparatus and the like." J. L. Baird Television, Ltd., and Baird Television Development Co., Ltd. January 31st, 1929. (Divided application on 328,616.) (330,220.)

38,985. "Electric motor-control systems." L. Miller, C. Filmer, and Associated Electrical Industries, Ltd. August 27th, 1929. (Divided application on 326,134.) (330,491.)

1930.

10,256. "Electric switchgear." British Thomson-Houston Co., Ltd. December 31st, 1927. (Divided application on 303,383.) (330,252.)

Trade Mark Applications.

THE following are among the recent applications for British trade marks. Objections against any of the proposed marks may be entered within one month from June 25th :—

E.I.S.L. (lettering and design). No. 510,916. Class 5. Wire for electrical purposes.—Electro Insulation, Ltd., Meadow Street, Sheffield.

Bulldog No. 508,198. Class 8. Accumulators (electric) for use on motor vehicles.—Pritchett & Gold & E.P.S. Co., Ltd., 50, Grosvenor Gardens, S.W.1.

Strad (lettering and design). No. 511,659. Class 8. Radio-telephonic apparatus and parts thereof, radio-receiving sets in combination with gramophones, &c.—J. E. Loynds & Co., Hutchinson Court, Duckworth Street, Darwen.

Super Radio Co., Wireless Specialists (lettering and design). No. 512,353. Class 8. Radio-telephonic apparatus.—Super Radio Co., 112, Whitechapel, Liverpool.

Siemafer, No. 512,693, and Siemaperm, No. 512,807. All goods in Class 8. —Siemens & Halske Gesellschaft, Berlin. (British representatives: Haseltine, Lake & Co., 28, Southampton Buildings, Chancery Lane, W.C.2.)

Beacon. No. 512,807. Class 8. Electric cables and flexibles.—Beaconectric, Ltd., 158. Stonehouse Street, Clapham, S.W.4.

Micadex. No. 513,210. Class 13. Sparking plugs.—Lissen, Ltd., Worple Road, Isleworth.

Steatain. No 513,060. Class 13. Clamps, hooks, rings, &c., for use on or in connection with electrical insulators.—Steatite & Porcelain Products, Ltd., 56, Victoria Street, Westminster, S.W.1.

Thermorad. No. 511,575. Class 18. Electric, gas, and oil fires and radiators.—Clifford Hole, 87, The Ridgway, Acton, W.3.

Annealogic. No. 512,962 Class 40 Electrical insulating materials composed mainly of india-rubber and gutta-percha.—Telegraph Construction and Maintenance Co., Ltd., 38, Old Broad Street, E.C.3.

Saxite. No. 513,115. Class 50. Insulating materials for electrical purposes.—Westinghouse Brake and Saxby Signal Co., Ltd., York Road, King's Cross, N.1.

Low-temperature Carbonisation.

Mr. J. E. Starkie, Burnley's electrical engineer, has issued a report on the low-temperature carbonisation of coal in relation to the generation of cheap electric power. He has expressed the opinion that a site eminently suitable for the erection of such a plant was to be found on the western side of the Oswald Street gas works. Whilst it would be idle to dispute that healthy rivalry between gas and electricity had stimulated inventive genius and keenness in both industries, he said, it was now becoming recognised that the divorce of gas and electricity undertakings had not been an unmixed blessing. There were important directions in which the co-operation of the gas, electricity, and coal-mining industries, if taken advantage of, might prove of inestimable benefit to the country. The low-temperature process would, he thought, open out a wide field for the co-operation of these three industries which must ultimately revolutionise the home and industrial development (1) by providing a readily ignitable smokeless semi-coke fuel with radiation qualities superior to that of coal and (2) by providing gas, motor spirit, fuel oil, creosote pitch, and other derivatives of coal tar for industrial use. As to the importance of electric power on the industrial future of this country, one had only to point to Germany, Italy, France, and the United States, where electricity supply had advanced by leaps and bounds, and had transformed manufacturing production in those countries.

New Work for Contractors.

Particulars of new works and building schemes for the use of electrical installation contractors in search of work and all interested in the sale of electrical and allied plant and other products.

Publication in this list is no guarantee that electrical work is definitely included. Alleged inaccuracies should be reported to the Editors.

ASPATRIA (CUMBERLAND).—Housing scheme (48) for the U.D.C.; surveyor.

BATH.—Secondary schools, Beechen Drive (£50,579), for the city E.C.; J. Long & Sons, Ltd., builders.

BOLTON.—Housing scheme (477), Hall-i'-th'-Wood estate (deposit £2 2s.); housing director, Westminster Bank Chambers, Old Hall Street North.

BRIGHTON.—Alterations, Academy Picture Theatre, West Street; Gaumont British Picture Corporation, Ltd. Dormitories, Walpole Lodge, Walpole Road; Rev. Mother Superior. Town Hall extensions; J. J. Denman, architect.

CHERTSEY.—Drill hall for Territorials at Drill Hall Road (returnable deposit of £2 2s.); Jarvis & Richards, architects, 8a, Lower Grosvenor Place, S.W.1.

CHESTER.—School (640 places), Great Boughton, for the county E.C.; R. Potts, clerk, Chester.

CHESTERFIELD.—Senior boys' school, Boythorpe, for the Borough E.C.; Wilcockson & Cutts, architects, 12, Saltergate (returnable deposit of £2 2s.). Houses (150), for the T.C.; Jackson & Fryer, architects, 6, Stephenson Place (60); Rollinson & Sons, Corporation Street (42); and Clayton & Rignall, 12, Corporation Street (48); (returable deposit in each case £1 1s.).

CHINGFORD.—Housing scheme (40) for the U.D.C.; surveyor (returnable deposit of £2 2s.).

COVENTRY.—Café and offices at Pool Meadow car park; city engineer.

DELNY (ROSS-SHIRE).—Alterations and extensions, Kindeace mansion, for Gen. Pollok M'Call; R. Pert & Sons, builders, Montrose.

DERBY.—Extensions, borough hospital (£50,000), for the T.C.; borough engineer. Dancing, skating, and billiards hall, Ashbourne Road; G. A. Hickling, Hodgkinson Hotel, Matlock. Baths (£79,500) for the T.C.; Gee, Walker & Slater, builders. Extensions, isolation hospital (£40,000); borough engineer. 260 houses by direct labour; borough engineer.

DONCASTER.—Houses: 104 at Askern, 50 at Armthorpe for R.D.C.; W. R. Crabtree, surveyor.

ECCLES.—Housing scheme (423), Westwood Park, Barton Hall Park, Lewis Street, &c.; borough engineer.

EDINBURGH.—Buildings, at West Park Place, for MacVitties, Guest & Co., Ltd.; the manager.

FAREHAM.—Rebuilding SS. Peter and Paul Church; Sir Charles Nicholson, architect.

FENTON.—55 houses, Vivian Road, for Stoke-on-Trent Corporation (£18,010); C. Cornes & Son, Hanley. 46 houses, Holly Place (£14,952); Stoke-on-Trent Corporation Works Department.

GLASGOW.—Mental institution, Lennox Castle; Board of Control and Corporation. Tenements, Stewart Street area; housing director.

GOVAN.—Extensions, District Asylum (£4,000); J. Taylor, architect.

GRANTHAM.—Equipment of factory for the British Corosit Button Co., Ltd., Homerton, London, E.

HATFIELD.—Additional 74 houses for the R.D.C.; surveyor.

HAYES.—Additions to Cottage Hospital; H. S. West, architect, 40, The Broadway, Ealing.

HEMEL HEMPSTEAD.—70 houses, Handpost Farm estate; borough engineer.

HORNCHURCH.—Houses (55), Purbeck Road, for Martin and Pearce. Houses (108), Southdown Road and Northdown Road, for G. J. Crabb.

HUDDERSFIELD.—Schools and extensions (£56,380) for the borough E.C.; director of education. Public washhouses for the T.C.; borough architect.

IRISH FREE STATE (ATHLONE, CO. WESTMEATH).—Erection of new church, for the parish priest (returnable deposit £3 3s.); Wm. H. Byrne & Son, architects, 20, Suffolk Street, Dublin.

KENT.—Schools at Swanscombe, Southborough, and Swanley Junction, for County E.C.; E. Salter Davies, director of education, Maidstone.

LEEDS.—Chemistry department for the University; Lanchester & Lodge, architects, 19, Bedford Square, London, W.C.1; clerk of works, 5, University Road, Leeds.

LONDON (HACKNEY, E.).—Factory and garage, Urswick Road; Sir W. Prescot & Sons, Ltd. Multi-storey car park for Clapton Stadium, Ltd., Millfields Road; Wallis, Gilbert & Partners, architects.

(EAST HAM, E.).—Municipal offices for the T.C.; borough engineer.

(ILFORD, E.).—Factory for Redaluma Paint Co., Grove Road; G. H. Miller & Co.

(HORNSEY, N.).—Enlargement, School of Art (£22,270); A. Monk, Edmonton.

(ST. PANCRAS, N.W.).—Extensions, London Foot Hospital, Fitzroy Square (£20,000); governors.

(CHELSEA, S.W.).—Cinema, King's Road, for Associated British Cinemas, Ltd.; W. R. Glen, architect.

(FULHAM, S.W.).—64 flats, North End Road; C. & E. Joseph. Institute and schools, Munster Park Chapel, Fulham Road; J. Ross Wills. Factory for Macfarlane, Lang & Co., Ltd., biscuit manufacturers, Fulham.

LUTON.—Works extensions, Vauxhall Motors, Ltd.; E. Howard & Partners, architects, St. James's Street, London, S.W.

MANCHESTER.—Gorton Mount Municipal Senior School (deposit £2 2s.); acting director of education, Education Offices, Deansgate. Ladybarn Municipal School, Briarfield Road (deposit £2 2s.); acting director of education, Education Offices, Deansgate.

MIDDLESEX.—Children's ward and X-ray department at Park Royal Hospital (£50,000); county architect.

(HARMONDSWORTH).—Additions to school buildings for County E.C., also electric light; W. S. Try, contractor, Uxbridge.

New schools at Ickenham, Hillingdon, Southgate, and Kingsbury; Education Committee.

MILL HILL.—Secondary school, Hall Lane; Middlesex Education Committee.

NEWCASTLE.—Municipal buildings, Eldon Square site; city engineer.

NORTHERN IRELAND (BELFAST).—Houses (42), Lower Broadway, for J. R. & W. C. McKee; W. R. Rogers, architect.

NORTHWOOD.—Houses (82) for U.D.C. (£33,720); Universal Housing Co., Ltd., contractors.

PLYMOUTH.—Church, Ford Park Road; trustees, First Church of Christian Scientist. Second section, mental hospital and convalescent home; borough architect. Alterations, Ford Palladium and Alhambra Theatre; licensees.

ST. HELENS (LANCS.).—Three schools (1,520 places) for the borough E.C.; W. H. Andrew, clerk.

ST. LEONARDS-ON-SEA.—Additions to the Royal Victoria Hotel; P. Oxley, architect, 19, Havelock Road, Hastings.

SOUTHEND-ON-SEA.—New St. Margaret's Church, Lime Avenue; incumbent.

STOCKTON.—Secondary school; Durham county architect.

STOKE-ON-TRENT.—Extensions, Turnhurst Road hospital; city engineer. Hospital, London Road; P. Pemberton of Tunstall and Couzens & Akers, Ltd., Birmingham. 40 houses, Etruria estate; city engineer.

TAUNTON.—Block of shops, Victoria Rooms (£5,000), for the T.C.; borough surveyor.

UPTON (YORKS.).—Houses (364) for the Upton Colliery Co., Ltd.; Housing Corporation of Great Britain, Ltd.

WEST RIDING (ASKERN).—School for county E.C.; director of education, Wakefield. Schools at Ripponden and Pontefract, for county E.C.; H. Wormald, architect.

WIGAN.—Extensions, Royal Infirmary; T. Worthington and Sons, architects.

WILLESDEN.—Extensions, Park Royal Hospital (£50,000); Middlesex C.C.

WREXHAM.—Houses (118) for the T.C.; builders: W. F. Humphreys, Acrefair (68), and Gittins & Sons, Johnstown (50).

YORKSHIRE (LEEDS).—Additions to University; Lanchester and Lodge, London, W.C.

YATTON.—Works extensions for Wake & Dean, Ltd.; Priest and Mullings, Ltd., builders, Avondale Works, Netham, Bristol.